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ASSAY OF OPIUM AND ITS PREPARATIONS.

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Owing to the appearance of several new Pharmacopœias, our own among the number, the present may be considered an opportune moment for the publication of a strictly volumetric method by which the relative therapeutical and commercial value of this drug can be determined, so far as the same depends on its percentage of morphia, which on the whole may be considered a just criterion.

The method which I propose, after a twelve-month's experience with it, embraces many leading points of the assays from time to time recommended by members of our profession, and, as do all the others, turns upon the ultimate elimination of the morphia out of the complex material represented in this vegetable juice. I believe that it will be found accurate in its details, and practicable, even with a limited amount of means, scientific as well as mechanical, being essentially simple in its manipulations, and requiring much less time than is ordinarily consumed for the purpose.

The main principle of the assay, is the titration of the alkaloids by a graduated test liquor, a solution of mercuric chloride in an excess of iodide of potassium, which I proposed for the purpose at the last meeting of the American Pharmaceutical Association, (Proceedings for 1862), and the application of which generally, and in particular in the case of two other

important narcotics I gave in the January, 1863, number of this Journal.*

The point next in importance is the separation of the morphia from the accompanying alkaloids. Here I have made use of the solubility of this base in solutions of fixed alkalies, the discovery of which is severally claimed by Robinet, Thiboumery, and Pelletier, and which Couërbe introduced into the assay afterwards adopted by F. Mohr.

Couërbe and Mohr employ caustic lime as the solvent, and boiling heat to bring about the solution, and this method is known to furnish the alkaloid in the purest condition. The objections to it are, that it necessitates too much evaporation, and that a considerable quantity of the alkaloid escapes precipitation, or is rendered non-precipitable by ammonia.

The cause of the first of these objections is the solubility of morphia in solutions of salts of ammonia, and in an excess of caustic ammonia, and that of the last named is the action of all alkalies, ammonia not excepted, on this and other alkaloids, in the course of time or when aided by heat. The solubility of morphia in salts of ammonia has been turned to account by O'Shaughnessy in his assay of opium, and the same principle has lately again been recommended by Haines. While it is a source of loss in Mohr's process, it is altogether inapplicable for the accurate separation of narcotina from morphia, as used by

* It appears from the report of Mr. E. Baudrimont on prize essays, rendered to the Société de Pharmacie, Paris, November 12, 1862, (Journal de Pharmacie, xliii p. 49) that a thesis treating on the qualitative and quantitative testing of alkaloids, and which received the prize of that year, was entered on July 22 last by Mr. Alfred Valser, in which he makes use of the same reagent for the same purpose. I cannot judge of the full merits of Valser's paper, not being as yet in possession of it, and because its quantitative portion is entirely passed over in Fresenius' Zeitschrift für anal. Chemie (ii p. 78), and I refrain, therefore, from referring to certain points mentioned in the above places, which are at variance with my own observations and those of Planta, Boedeker, Delffs, Nessler and Groves, none of which authors have been consulted. The suggestion to apply the reaction is Groves', as I have pointed out in my original paper. Otherwise, Mr. Valser's thesis is dated fully a month prior to the last meeting of the American Pharmaceutical Association, though made public only some months after.

O'Shaughnessy and Haines, for the reason which was pointed out by Fordos, that narcotina also dissolves in salts of ammonia, and since in fact all other solid alkaloids expel ammonia from its salts, the sesqui-carbonate excepted.

There can be no doubt as to the solubility of morphia in caustic and carbonated ammonia; according to Donné 1 part of morphia requires 110 parts of liquid ammonia, (spec. gr. ?) and according to Duflos, 117 parts (spec. gr.=·96) for solution. Such a solution rapidly turns brown in the air, a resinous substance being formed, which is separated by the addition of acids, and this at the expense of the alkaloid, as has been shown by Reveil, with the formation of meconic acid, as stated by Guibourt, (Journ. de Pharm. xli. p. 115). I have satisfied myself that more than a slight excess of ammonia, which may eventually be vaporized by exposure of the solution in an open vessel, acts injuriously by preventing deposition to a considerable extent, and I believe that the accuracy of the results obtained by precipitation according to Merck and Dr. E. R. Squibb, are due to this consideration, besides to a proper concentration of the liquid.

The fixed alkali which I employ is crystallized baryta, prepared according to F. Mohr's process, and sufficiently pure when merely drained on a covered glass-funnel. It has this advantage over all others—that it can be used in the solid form, and that at the same time the degree to which the liquid is to be rendered alkaline is perfectly under the control of the operator; that it dissolves largely in watery fluids, and that its own aqueous solution dissolves morphia quite largely at ordinary temperatures,—100 cubic-centimeters 2·5 grammes and upwards. The opium-alkaloids soluble in water are likewise dissolved by this alkali, while narcotina and thebaina, and all others, are entirely insoluble in it, unless heat be applied or their contact be prolonged for a day, which is much beyond the time required in the assay.

From a solution of equal parts of morphia, codeïa and narcotina in very dilute sulphuric acid, shaken with a considerable excess of crystallized caustic baryta, every particle of the two first named alkaloids passes again into solution. When the flask containing the mixture be heated to short of the boiling

point, nearly half of the narcotina will be dissolved likewise, and there is a partial decomposition of this alkaloid; after remaining together for some eight hours at a summer-temperature, on being filtered the acidulated filtrate requires an excess over the calculated amount of iodohydrargyrate. Thebaina shows precisely the same behaviour.

I consider the use of this alkali, therefore, as the most convenient method for the separation of morphia and the soluble alkaloids from narcotina and its kind. From an aqueous solution of opium, it removes besides, in great portion, those substances which interfere with the deposition of morphia, and which had not before been removed by water. Saturated with the soluble alkaloids of opium it deposits them in part on being partly saturated with acids; slightly supersaturated with moderately dilute sulphuric acid and then boiled with or passed through animal charcoal without much dilution, such a solution at once precipitates the morphia in a pure condition by the careful addition of ammonia and with some stirring. It is sufficient for an accurate assay, to supersaturate the barytic solution with hydrochloric acid, and to precipitate the morphia then by ammonia.

Washing the precipitated alkaloids of opium is generally a profitless operation. Guibourt is of the opinion that part of the morphia, especially when ammonia be used too sparingly, is in the form of submeconate; whether or not this be the case, the impure alkaloid is quite soluble in water, and prolonged washing may therefore cause considerable discrepancies in the results. I believe that it will be found more correct to wash only as long as the liquors acidulated with nitric acid indicate the presence of chlorine from adhering mother-water.

The mother-liquor from which, after one inspissation, the remainder of crystallizable alkaloid has been recovered, may, after filtration, be used to determine approximately the amount of morphia by subtracting its equivalent in cubic centimeters or grains of sol. iodohydr. from that required by the quantity of liquid from which the morphia was precipitated, and this again is ascertained from a small portion of the barytic solution; the residual assay, however, is only approximative, as it is but rarely that the numbers show perfect agreement.

As before remarked, much depends upon a proper concentra-

tion of the solution, and this again is closely dependant upon the quantity of opium taken to assay. It is impossible to exhaust by any known means the extract of even so small a quantity as 5 grammes of opium (80 grains) with less than 75 cc. of water; but the solution so obtained is too weak to allow more than a fraction of the morphia to be precipitated.

A solution from which the morphia is to be speedily deposited after the addition of ammonia, must hold at least one per centum of the alkaloid; only about one-ninth then remains in the liquor; in pure solutions none whatever.

I have found it best to use opium in substance, 15 grammes or half a troy ounce, and 100 cubic centimeters, or three fluid ounces, as the bulk of the solution. Since the amount of morphia in such a quantity would rarely exceed two grammes, it is the proper bulk for a solution to be saturated with baryta.

In order to exhaust opium or its preparations, it is necessary to employ hot acidulated alcohol, varying in strength with the amount of moisture in the substance. Below will be found three assays of the same powdered opium, extracted under different circumstances, and all performed in a satisfactory manner, which may illustrate the comparative value of the different menstrua and quantities.

The quantity of alcohol should not be less than that used by Merck, 24 parts, but in several more fractions.

This extract after the evaporation of alcohol and reduction to about five cubic centimeters is mixed with cold water, the vessel being at the same time cooled from without. The advantages gained by this portion of Gregory's process are very great, and in ordinary cases render further purification unnecessary. The watery solution and the washings of the black resinous precipitate with hot water, must then make up 100 cc. or three fluidounces.

Aqueous extracts of opium are redissolved in alcohol of 85 p. c., and then treated in the same manner as the above. In some cases, as in examining inspissated mother-liquors, precipitation with acetate of lead becomes necessary, as otherwise the baryta precipitate would be too bulky; of this an example is given below.

The addition of caustic baryta to the acidulous watery ex-

tract causes precipitation of acids and bases, and a magma forms at first which grows thinner by degrees. This precipitate leaves but a very small volume on drying, corresponding to the quantity of baryta that has been added. The increase in bulk of the mixture is almost entirely, within 0·5 cc., due to this precipitate. It may therefore be considered altogether unnecessary to make any reduction for this minute degree of dilution.

That there exist certain fixed relations, and some mutual dependance between the various ingredients of opium, may in part be gathered from the assays communicated below. I have, however, thought it best to leave such inferences to future consideration, since they might lead to the adoption of approximative methods, only useful in the hands of those accustomed to assaying opium, for the purpose of facilitating the operation.

Assay of Morphia and its Salts.

The precipitate which morphia forms with solutions of mercuric chloride, was first noticed by Caillot (Ann. [Chem.] Pharm. ix. 328, (1834,) and A. v. Planta describes it as a "yellowish pulverulent precipitate, which soon assumes a gelatinous condition, characteristic for this alkaloid. It is insoluble in hydrochloric acid." (Das Verhalten der Alkaloide, Heidelberg, 1846.) He might have added that it is unusually soluble in water as compared with the precipitates of most other alkaloids, so much so as to render the residual method with silver applicable only under certain restrictions.

It is readily decomposed by a process analogous to that of Liebig and Merck for emetina, and has been analysed by Groves; the formula he has given, $C_{34}H_{19}NO_6$, HgI_2, must be changed to $C_{34}H_{19}NO_6$ $HI+HgI$, in accordance with that of the alkaloid precipitates examined by Boedeker (Ann. Chem. Pharm. lxxxiii. 372. Gmelin's Handbook, vol. xiv.) and the compounds precipitated by mercuric chloride and cyanide.

I. A double equivalent of morphia,* $2(C_{34}H_{19}NO_6+2Aq.)$ 606,

* The doubling of the equivalent appears advisable not only on account of the more lately adopted formula of the sulphate, but also for greater convenience in calculation, since a single equivalent would represent 1500 cc. of test liquor.

requires for precipitation a small excess over 3000 cubic centimeters of the $\frac{1}{10}$ normal solution of iodohydrargyrate, in the ratio of 50 cc. instead of 49·5 cc., and owing to the same cause, —solubility in water,—the $\frac{1}{5}$ normal troy solution (16·22 grains mercuric chloride, and 60 grains of iodide of potassium in 6000 grains) is too weak to give accurate results; in its place a *normal* solution is to be used, containing 135·5 grains of corrosive sublimate, and 498 of the iodide in 10,000 grains by weight. Of this solution 16 grains are almost exactly equivalent to one cubic centimeter of the decimal solution. I do not think its comparison with a silver solution advisable, as it would be difficult in the hands of those not provided with proper graduates always to obtain the required concentration.

$$\textit{Morphia}, \ C_{34}H_{19}N\overset{+}{O}_6+2Aq\ (\overset{+}{Mo})=303.$$

Two grammes of the crystallized alkaloid dissolved in water with the aid of dilute sulphuric acid and diluted to 200 cc. Of this

40 cc.	required	20 cc.	of sol. iodohydr.
45 cc.	"	22·6 cc.	
50 cc.	"	24·9 cc.	
10 cc.	"	5·1 cc.	
30 cc.	"	15·0 cc.	
175 cc.	"	87·6 cc.	

100 cc. therefore consumed 50·006 cc. sol. iodohydr.

The first precipitation was performed in a 100 cc. flask, which was filled with water up to the mark, and filtered; by pressing the jelly over another filter, 92 cc. of filtrate were obtained. The precipitate itself on drying leaves but a very small bulk of dirty yellow powder.

40 cc. of the filtrate, mixed with carbonate of lime and neutral chromate of potassa,

	required	21·3 cc.	of $\frac{1}{10}$	normal solution	of silver.
40 cc.	"	21·5 cc.	"	"	"
10 cc.	"	5·4 cc.	"	"	"
90 cc.	"	48·2 cc.	"	"	"
or 100 cc.	"	53·8 cc.	"	"	"

As the 100 cc. represent 40 cc. of a solution of morphia = 0·4 grammes, and 20 cc. sol. iodohydr., equal to 80 cc. sol. silver, of which latter only 53·8 reappear in the filtrate, an amount of iodine equivalent to the silver contained in 26·2 cc. of sol. silver has combined with 0·4 grammes of morphia.

One gramme of morphia in being precipitated with 50 cc. of sol. iodohydr., therefore, combines with iodine, equivalent to 65·4 cc. of sol. silver.

According to the formula, $2(\overset{+}{Mo}HI + HgI,)$ 49·5 cc. of sol. iodohydr. equal to 198 cc. sol. silver lose one-third, = 66·12 cc. sol. silver, and retain two-thirds, = 132 cc. sol. silver, of iodine and chlorine.

A loss of 66·12 cc. sol. silver from the four-fold number of cc. sol. iodohydrar. used is therefore equivalent to one gramme of morphia, expressed by the formula $\frac{4n\,Hg - n\,Ag}{66{\cdot}12} = x$ grammes $\overset{+}{Mo}$; nHg = the number of cc. sol. iodohydr.; nAg = that of cc. sol. silver required to completely precipitate the filtrate.

The amount of silver solution increases, however, with the dilution of the filtrate from the precipitate, and this residual method becomes inaccurate when the morphia precipitated is less than 0·3 grammes to 100 cc. of filtrate. While, therefore, it is useful in determining the composition of the precipitate, we cannot conveniently rely on it in the assay of opium.

II. Five grains of crystallized morphia require for complete precipitation 257 grains of normal troy solution of iodohydrargyrate. Ten grains of the latter are equal to 0·233 of a grain of morphia.

Sulphate of Morphia. $2(C_{34}H_{19}NO_6, SO_3HO) + 10\,HO = 758$.

One gramme of sulphate of morphia requires for precipitation 40 cc. (resp. 39·58 cc.) of sol. iodohydr.

One gramme of it combines with iodine equal to 53·11 cc. sol. silver, which leads to the formula $\frac{4n\,Hg - nAg}{53{\cdot}11} = x$ grammes sulphate of morphia.

Five grains of sulphate of morphia dissolved in one fluidounce of water consumes 208 grains of normal Troy solution; 10 grains of the latter therefore represent 0·244 of a grain of the salt.

Liquor Morphiæ Sulphatis. U. S. Ph.

Two fluidounces containing two grains of sulphate of morphia

require for precipitation, according to temperature, from 90 to 100 grains of normal Troy solution.

20 minims of Liquor Morphiæ Sulphatis U. S. Ph. mixed with one fluid ounce of water produces neither cloudiness nor a precipitate on the addition of 20 minims of normal Troy solution of iodohydrargyrate.

Magendie's Solution of Sulphate of Morphia (16 grs. per fluidounce.)

One fluidrachm mixed with the mercuric solution congeals into a semi-solid mass; it is necessary to dilute this solution.

One fluidrachm mixed with two fluidrachms of water requires for precipitation 83 grains of normal Troy solution.

Twenty minims of Magendie's solution mixed with one fluidounce of water produces a thin, semi-transparent jelly, on the addition of 20 minims of normal Troy solution of iodohydrargyrate.

Acetate of Morphia $2(C_{34}\,H_{19}\,NO_6,\,C_4\,H_4\,O_4) = 690$.

One gramme in 100 cc. of water consumes 44 cc. (resp. 43·48 cc.) of $\frac{1}{10}$ normal solution of iodohydrargyrate. It combines with iodine equal to 57·77 cc. of sol. silver; therefore $\frac{4n\,Hg-n\,Ag}{57 \cdot 77} = x$ grammes acetate of morphia.

Five grains require 217 grains of normal Troy solution; 10 grains of the latter are equal to 0·234 of a grain of acetate of morphia.

Hydrochlorate of Morphia. $2(C_{34}\,H_{19}\,NO_6,\,HCl + 6\,Aq.) = 751$.

One gramme dissolved to 100 cc. requires 40·5 cc. (resp. 39·9 cc. by calculation) of sol. iodohydrargyrate, and for the chlorine contained in it 26·6 cc. of sol. silver. It combines with iodine equivalent to 79·8 cc. of sol. silver. 5 grains of the hydrochlorate dissolved in two fluidounces of water consume for precipitation 207 grains of normal Troy solution of iodohydrargyrate.

Narcotina $C_{46}\,H_{25}\,NO_{14} = 427$.

The precipitate is pale yellow, and curdy, and becomes pulverulent after a time; it dissolves but with difficulty in water even at the boiling point; the portion remaining undissolved fuses into resinous globules which float on the surface; on

cooling, that which had dissolved is again completely precipitated.

One gramme of narcotina dissolved with the aid of a little dilute sulphuric acid to 100 cc., requires for precipitation 46·8 cc. $\frac{1}{10}$ normal solution of iodohydrargyrate. The same quantity combines with one third of the iodine contained in the precipitant equivalent to 46·8 cc. of $\frac{1}{10}$ normal solution of silver; the mercurial precipitate must be removed by filtration, on account of its being acted on by the silver solution.

For the determination of narcotina by apothecaries' weights and measures, the $\frac{1}{5}$ normal Troy solution of iodohydrargyrate is sufficiently accurate.

Codeïna $= 2(C_{36}H_{21}NO_6 + 2Aq.) = 634.$

This alkaloid shows great analogy with morphia in this and other reactions; the precipitate is curdy.

One gramme requires for precipitation 47·32 cc. of $\frac{1}{10}$ normal solution of mercury, and combines with iodine equivalent to 63·1 cc. of sol. silver.

Opium.

I. *Smyrna opium*, of recent importation, contains 17·3 p. c. of water. A preliminary assay was made with 15 grammes, cut into small pieces, which were placed in a 6 ounce beaker and digested in the water bath with 100 cc. of 80 p. c. alcohol and one gramme of oxalic acid, until no more brown lumps appeared in the mass. After allowing to settle, the liquid portion was poured off on a filter and the dregs pressed out with a porcelain spatula, but retained in the beaker. They were again heated with 100 cc. of alcohol of the same strength, and the hot tincture passed through the same filter. The flask with the filtrate from the two infusions was then placed in the water-bath to evaporate, while the exhaustion of the dregs was continued with 30 cc. of alcohol at a time, the same filter being used and the tinctures received in another flask until 350 cc. of alcohol had been used for the purpose. A small quantity of the last filtrate, evaporated and redissolved in hydrochloric acid, showed still distinct traces of alkaloids, but too slight to come into consideration. The washings being likewise evaporated to a small bulk were combined with the first portion, and the whole

reduced to about the bulk of 15 cc. This was then mixed very gradually with 50 cc. of cold water, set aside for two hours, and the liquid which had then become clear, was poured off into a 100 cc. flask, while the resinous precipitate in the flask was repeatedly washed with 10 cc. of hot water at a time until the whole solution measured 100 cc.; the resinous matter was then quite brittle, and contained scarcely a trace of alkaloid.

10 cc. of this solution after cooling consumed 21 cc. sol. iodohydr.
20 cc. " " " 43·5 cc. " "
or the 100 cc. were equal to 215 cc. of sol. iodohyrdr.

The remaining 70 cc. were then agitated with 8 grammes of caustic baryta, the flask being securely closed by a cork, and the shaking continued as long as the crystals of baryta seemed to disappear. The mixture was then poured on a filter sufficiently large to hold half the bulk of the liquid, and the filtrate received into a flask with a neck wide enough to admit a pipette; the funnel during this operation was loosely covered with a piece of plate-glass.

20 cc. of the barytic solution were supersaturated with strong hydrochloric acid, and diluted with water to 50 cc; which, measured in two portions, required 30·2 cc. of sol. iodohydr. equal to 151 cc. from the 100 cc. representing the 15 grammes of opium.

II. 15 grammes of the same opium were treated in precisely the same manner. 10 cc. of the acid solution required 22·1 cc. sol. iodohydr., equal to 221 cc. for the 15 grammes.

The remaining 90 cc. were treated with baryta, and gave 72 cc. of filtrate; 18·5 cc. of this, acidulated with hydrochloric acid consumed 27·2 cc. of sol. iodohydr., equal to 147 cc. for the 100 cc. representing 15 grammes of opium.

50 cc. of the barytic solution drawn into a small beaker were supersaturated with strong hydrochloric acid in sufficient quantity to re-dissolve the precipitate at first thrown down by it; it was then again neutralized with strong solution of ammonia added by drops. As soon as the atmosphere over the fluid, after purifying it by blowing, showed a faint reaction on moist turmeric paper, one or two more drops of ammonia were added, and the glass placed aside. The ammonia likewise caused a curdy precipitate which soon settled and gradually

fastened on to the sides and bottom of the vessel; it contained a considerable portion of morphia, but no other alkaloid. When this precipitate had subsided the liquid was repeatedly and briskly stirred with a glass rod, which afterwards remained with it; after standing for 8 hours the morphia had nearly all crystallized out, partly in the form of dark colored warty aggregations, partly as a pale brown powder on top of the resinous precipitate on the bottom. The mother liquor was then carefully filtered into a porcelain capsule, the crystals and the filter once washed with the same water, the filtrate acidulated with hydrochloric acid, and evaporated to a syrupy consistence by means of the water-bath. The residue was treated with 10 cc. of water, which formed a tolerably clear solution, and could be poured off without any loss from the crystalline and resinous deposit. This solution was again slightly supersaturated with ammonia, and left for 8 hours; the second mother-liquor was then passed through the same filter, and the later washings of the first and second precipitate and of the capsule likewise. The filter, washed until it no longer gave off any chlorine, was placed in the beaker with the first precipitate, the funnel rinsed with dilute hydrochloric acid, the second precipitate dissolved in the same acid warm, and the solution added to that of the first in hydrochloric acid, so as to make one solution, which was then poured off, and with the washings diluted to 100 cc.

They required for precipitation 54 cc. of sol. iodohydr., equal to 108 cc. sol. iodohydr. from the 100 cc. representing the 15 grammes of opium.

108 cc. sol. iodohydr. are equal to 2·16 gram. of cryst. morphia.
= 14·39 p. c. of the moist opium,
and
= 17·42 p. c. of the dry opium,

The (221—147 =) 74 cc. difference represent the alkaloids insoluble in baryta, which calculated as narcotina would show 1·58 grammes of narcotina, = 10·5 p. c. of the moist opium,
= 12·7 p. c. of the dry opium.

The (147—108 =) 39 cc. difference express the amount of non-precipitable alkaloid, viz. codeina, narceina. The mother-liquor from the above precipitate of 2·16 grammes of morphia required 17·4 cc. of sol. iodohydr. instead of 19·5 cc.

III. Half a troy ounce of the same opium was exhausted in the same manner with 12 fluidounces of 80 p. c. alcohol and 15 grains of oxalic acid; the alcoholic extract was diluted to 4 fluidounces, of which

3 fluidrachms required 325 grains of Troy sol.

The remainder was treated with BaO, and of the filtrate

4 fluidrachms acidulated with hydrochloric acid required 293 grains Troy sol.

2 fluidounces of the baryta solution were treated as above for the separation of morphia; the precipitates required 853 grains of Troy sol. iodohydr. or 16⅔ grains of morphia, equal to 1700 grains of sol. or 33⅓ grains of morphia in the half ounce of opium.

This is equal to 13·875 p. c. of morphia in the moist opium, and
16·79 p. c. " in the dry opium.

The difference from the results of Nos. I. and II., show in some degree the comparative insecurity of partially weighing and measuring, and in the use of Troy and fluid-measures.

IV. Powdered opium containing 6·4 p. c. of moisture (after being kept in paper for half a year).

15 grammes were exhausted with boiling water acidulated with oxalic acid; the liquid portion strained off, and the dregs repeatedly treated with hot water, until scarcely bitter. Evaporated to dryness the extract was dissolved in alcohol of 85 p. c. and treated as in the above essays.

10 cc. required 16·3 cc. sol. iodohydr. = 163 cc. for 15 grammes of opium.

Of the solution treated with baryta, 50 cc. were used for precipitating the morphia; the alkaloid when separated required 45 cc. of sol. iodohydr., or 90 cc. for 14 grammes of opium = 1·8 grammes = 12 p. c.

10 cc. of the barytic solution acidulated with hydrochloric acid required 14·1 cc. sol. iodohydr. = 141 cc.

V. *The same powdered opium.* 15 grammes treated as was the crude opium in I. and II., with the exception, that the powder was transferred to the filter after the second infusion, and exhausted by displacement with hot alcohol.

10 cc. of the acid solution consumed 16·6 cc. After treatment with baryta, 10 cc. required 13·4 cc. of sol. iodohydr.

The morphia precipitated from 50 cc. of the barytic solution, was equal to 49·1 cc.; for 15 grammes therefore 98·2 cc. equal to 19·64 grammes of morphia = 13·09 p. c. of morphia.

VI. *The same powdered opium.* 9·3 grammes treated as the above and brought to an acidulated solution of 51 cc.

5 cc. of the same required 9·7 cc. sol. iodohydr. = 99 cc. for 9·3 grammes.

6·4 cc. of the barytic solution, after being acidulated, consumed 10 cc. sol. iodohydr., equal to 31 cc. from 20 cc. of barytic solution.

20 cc. of the same solution were used for separation of the morphia. The alkaloid by the first precipitation required

	19·45 cc.	sol.	iodohydr.
That by the second from the mother-liquor	2·5 cc.	"	"
	21·95 cc.	"	"
The residual mother-liquor required	9·05 cc.	"	"
	31·00 cc.	"	"

Which is precisely the amount required as indicated by the solution.

21·95 cc. sol. iodohydr. for 20 cc. are equal to 55·97 cc. for 51 cc. or 9·3 grammes of opium = 1·19 grammes morphia = 12·03 p. c.

VII. 15 grammes of the powder were treated as No. V. and found equal to 165 cc. sol. iodohydr.

50 cc. of the barytic solution yielded morphia equal to 45.1 cc. sol. iodohydr.; for 100 cc. or 15 grammes of opium = 1.804 grammes of morphia = 12.03 p. c.

VIII. *Tinctura Opii, U. S. Ph.* (Squibb's Standard).

100 cubic centimeters were treated in the same manner as the alcoholic solutions of I. and II.; the acid aqueous solution was diluted to 75 cc. only. They required, as taken from 10 cc., 84.375 cc. solution iodohydr. Of the baryta solution 40 cc. gave morphia equal to 25 cc. solution iodohydr., or for the 75 cc. of acid solution, or 100 cc. of tincture of opium 46.87 cc. sol. iodohydr. = 0.937 gramme morphia equal to 1.172 gramme of sulphate of morphia = 5.33 *grains of sulphate in the fluidounce.*

According to this assay the opium = 8·23 grammes in the above 100 cc. of tincture, contained as powder 11·4 p. c. of morphia; it had lost in drying 20·54 p. c.

IX. *Tinctura Opii, U. S. Ph.* (the same as above).

Four fluidounces treated as above with 10 grains of oxalic acid and reduced to 3 fluidounces.

Three fluidrachms required 232 grains Troy sol. iodohydr.

Fourteen fluidrachms of the barytic solution required 518 grains Troy sol. equal to 17·96 grains of morphia in the 4 fluidounces of tincture = 5·6 grains of sulphate of morphia per fluidounce.

X. *Tinctura Opii Deodorata, U. S. Ph.*, 1860.

20 cc. of the tincture evaporated and dissolved with dilute acid required 17·5 cc. sol. iodohydrargyr., equal to 87·5 cc.. from 100 cc. of tincture.

100 cc. of tincture were reduced to 75 cc. of aqueous solution. Treated with baryta the morphia from 40 cc. required 30·5 cc. sol. iodohydrarg. equal to 57·2 cc. from 75 cc. of solution, resp. 100 cc. of tincture, = 1·144 grammes of morphia to 17⅝ grains = 22⅛ grains of sulphate of morphia = 6½ grains of sulphate per fluidounce.

XI. *Vinum Opii, U. S. Ph.*

75 cc. with oxalic acid treated as were the above tinctures, and brought to 75 cc. of acid solution, which was in 10 cc. equal to 12·3 cc., in 75 cc. equal to 92·25 cc. of sol. iodohydr.

40 cc. of the barytic solution required for the morphia precipitated from it 29 cc. sol. iodohydr., or 54 cc. for the 75 cc. of Vinum = 1·086 grammes of morphia.

The 9·88 grammes of opium in the above quantity had a percentage of 10·99.

XII. *Extractum Opii, U. S. Ph.*

10 grammes treated with alcohol of 85 p. c., and 1 gramme of oxalic acid. The watery extract resulting according to the method described above, diluted to 100 cc. was equal to 205 cc. sol. iodohydr.

50 cc. of the barytic solution precipitated morphia to the amount of 64 cc. sol. iodohydr. = 1·28 grammes or 2·56

grammes in 10 grammes of extract, equal to 25·6 p. c. of morphia in the extract.

XIII. *The opium employed for the above extract.*

Eight ounces had yielded 3½ ounces of the above extract; the opium contained 19 p. c. of moisture.

15 grammes were treated as before mentioned to form 100 cc. of aqueous solution.

20 cc. of the latter required 31·2 cc. of sol. iodohydrargyr., equal to 156 cc. for the 15 grammes of opium.

Treated with baryta, the morphia from 50 cc. of the baryta solution required 45·5 cc. of sol. iodohydr., equal to 91 cc. for 15 grammes of opium = 1·82 grammes of morphia = 12·13 p. c. of moist = 14·97 p. c. of dry opium.

Eight ounces of opium contained 465 grains of morphia.

3½ ounces of extract contain 431 grains of morphia.

XIV. *Soluble extract*, supposed to be an inspissated mother-liquor. It was found necessary to precipitate the solution of this extract with acetate of lead previous to the treatment with baryta. This mode of thinning the fluid was resorted to after it had been proved by experiment that the lead precipitate in acetous solution carries down none of the alkaloids.

2 grammes of the extract diluted to 100 cc. with oxalic acid and water required for precipitation 25·75 cc. sol. iodohydr. = 257 cc. for 20 grms. 20 grammes of the extract were diluted with acetic acid and water to about 100 cc. and then precipitated by 50 cc. of a cold solution of acetate of lead. The mixture was poured on a filter, and 100 cc. of filtrate drawn off, which from the indications of 10 cc. would have required 165 cc. sol. iodohydr. The 100 cc. therefore represent $\frac{165}{257}$ of the 20 grammes of extract.

Treated with baryta, 50 cc. yield morphia equivalent to 32·5 cc. sol. iodohydr.; the 100 cc. therefore equal to 65 cc. = 1·3 grammes of morphia, and according to the proportion 165 : 1·3 : : 257 : x = 2·93 grammes is the amount of of morphia in the extract = 10·15 p. c.

In the above the outlines are given for all kinds of assay which may be required of opium and its preparations.

As there are other alkaloids in opium of which here no men-

tion has been made, I shall continue researches in that direction.

The alkaloids of other Papaveraceæ, sanguinarina (chelerythrina) and chelidonina, may be likewise drawn into the number which may be determined by this alkaloimetric method.

One gramme of *Sulphate of Sanguinarina* requires 41.66 cc. sol. iodohydr. One gramme of Chelidonina requires 54.49 cc. sol. iodohydr.

The colored derivatives of Anilina, resembling the colored alkaloids of Sanguinaria, Glaucium, Escholtzia, etc., in many properties, share with them also this precipitability by iodide of mercury. Though not strictly of pharmaceutical interest, I may mention that I have established an assay for Rosanilina in coloring mixtures and preparations, founded on its precipitation by iodide of mercury from acidulated solutions, while the blue pigment is affected only after a considerable length of time.

New York, August, 1863.

REVIEW OF THE UNITED STATES PHARMACOPŒIA OF 1860.

By Alfred B. Taylor.

Three years have passed between the meeting of the National Convention for revising the Pharmacopœia, and the publication of the Revision: and the finished product of the Convention and its Committee's labors is now before us. If this very unusual delay has been the subject of a natural impatience on the part of many, and the occasion of complaint with some, we think that the nature and extent of the alterations indicated in the work are a full explanation of its late appearance, and will with a majority fully atone for the disappointed expectation of its earlier reception. We learn from the Preface that the Committee of Revision held one hundred and nineteen weekly meetings, performing a large amount of their duties through the agency of sub-committees, working diligently in the interval, who made in the aggregate one hundred and thirty eight written reports.

This simple statement is a tolerably good index of the amount of care and labor bestowed by the Committee upon their work; and we believe it may be confidently said that no previous revi-

sion has elicited so thorough an examination of the entire subject of Pharmacy, or has introduced so extensive and important changes into the Pharmacopœia.*

The Committee were justified therefore we think, in saying (as is done in the Preface) that they " believe they have exercised all due diligence in the performance of their task, and think, considering the multiplicity of the details, the numerous appeals to experiment that were necessary, the differences of opinion among themselves, which gave rise to numerous discussions, and the vigilance required to preserve the unities of the work, that the labor devolved upon them could not have been properly accomplished in less time, due regard being had to their private avocations." (p. xxii.)

And yet notwithstanding all the care and vigilance undoubtedly bestowed by the Committee upon the revision, we have discovered one important error, to which we would wish to call particular attention. The error occurs in the formula for preparing Wine of Ergot (page 356.) While the quantity of Ergot is the same as in the old formula, the resulting product has been inadvertently increased from *one* to *two* pints; thus weakening a preparation (and a very important one) which is too weak already. The correction requiring the smallest amount of change in the printed text is to change "two" troyounces to "four" troyounces and to strike out the word "half" from the directions; so that the formula shall read as follows:

"Take of Ergot, in moderately fine powder, four troyounces;
Sherry Wine a sufficient quantity.

Moisten the powder with a fluidounce of Sherry Wine, pack it in a conical percolator, and gradually pour Sherry Wine upon it until two pints of filtered liquid are obtained."

This should be carefully noted by all who have early copies of the work. The error will be rectified in the main body of the published edition.

The first important change in the new Pharmacopœia to be

* In illustration of this it may be mentioned that of all the formulas in the book (including their accompanying directions) there is only ONE that stands *verbatim et literatim* as in the old Pharmacopœia of 1850. That one is "Acidum Aceticum Dilutum" on page 69 of the work; and even to this, the note has been altered.

noted is its modification of the system of weights. The only denominations of the former Apothecaries weight now retained are the *troyounce*, and the *grain;* the troy *pound*, the *drachm* and the *scruple* having been abandoned. The pound has been disused from the incongruity of having two differing weights of the same name, and from the constant danger incurred, of confusion and error, arising from the extensive employment by druggists and apothecaries, of the commercial avoirdupois pound. The "scruple" and "drachm" have been dismissed as unnecessary; and we think the "ounce" might advantageously have been included in the same category, in correspondence with a scheme presented in the March No. of this Journal for 1860, vol. xxxii. page 97; a scheme which would have relieved us entirely from the inconveniences of a double or compound metrology. The change made, is, however, we think, a good one, and the danger of confounding the apothecaries "ounce" with the avoirdupois "ounce," whether from inadvertence or design, is to a great measure guarded against by invariably writing the former one "troyounce;" thereby constantly calling attention to the peculiar value indicated. We would respectfully urge upon physicians the great importance and advantage of accustoming themselves as soon as possible to the system of the new Pharmacopœia in this respect.

The natural and proper point at which these reforms of the weights to be used in Pharmacy should have been considered and adopted by the Committee would evidently have been at the very outset of the task, and before the revision of the formulas of the preparations had been entered upon. Unfortunately, however, for the attainment of the most desirable results,—partly from diversities of judgment, and partly from the expectation that the new British Pharmacopœia would be given to the public at an early date,—the subject was postponed until the revision of the preparations had been completed; the consequence of which is that the formulas, without using the terms "drachm" and "scruple," are generally based (quite unnecessarily and sometimes disadvantageously) upon their values.

While there was a very general desire that something should be attempted to simplify the system of weights in medicine, there was by no means so uniform an opinion as to what that

something might be. Of the various projects brought before the consideration of the Committee, one was the avoidance of all weights and measures whatever in the presentation of formulas, by simply substituting abstract "parts;" giving thereby merely ratios or proportions and not quantities. Another was the adoption of what had been publicly announced and received as the British system of their new and forthcoming Pharmacopœia. This was the entire abandonment of the troy scale, and the engrafting of its divisions upon the common avoirdupois scale, by dividing this ounce into 480 parts, to be called grains (its actual or received value being 437·5 grains troy) and giving the new grains, scruples, and drachms, therefore the same relation to the avoirdupois ounce, that the old denominations bore to the troy ounce; thus reducing all their values $\frac{17}{192}$ or about one eleventh. The importance of uniformity between the two national Pharmacopœias was so acknowledged, that a strong effort was made to have the new scheme at once adopted. On the other hand, however, the extreme inconvenience of having the value of the grain disturbed, and the great labor that would be constantly involved in the particular kind of reduction required, formed as powerful an argument against the new system. Another project submitted was the simple adoption of the avoirdupois weights, entirely repudiating the former troy weights. Another not essentially different from this, was the employment of *grains* for estimating all weights, up to avoirdupois pounds, (of 7000 grs.) or up to half pounds, and quarters. And lastly, still another, was that finally adopted as a kind of compromise,—the plan of using only troy ounces and grains, of the old Apothecaries' weight.

We trust, if any further improvement is to be made in this matter, at the next decennial Revision of the Pharmacop œia, that the subject will be considered and digested at the commencement of the work, so that all the formulas may be carefully prepared,—not merely in terms, but quantitatively as well,—upon the adopted system.

We are now in a condition to see that it was a fortunate circumstance that the so-called "British–scheme" of weights was not adopted by the Committee: for we now learn since the completion of our Pharmacopœia, that the "General Council of

Medical Education and Registration" has rejected the plan adopted by the British Pharmacopœia Committee, and has resolved "That the weights used in the British Pharmacopœia, be the Imperial or avoirdupois pound, ounce, and grain; and that the terms 'drachm' and 'ounce,' as designating specific weights, be discontinued." This coincides very nearly with the plan which has been adopted for our Pharmacopœia.

The measures in use are not open to the objections which lay against the troy weights; and accordingly no change has been made in them, excepting that the term "gallon" has been discontinued, the equivalent number of pints being stated in all cases; the "pint," in other words, being accepted as the largest unit of liquid measure. The application of fluid measures is somewhat more restricted than in the former Pharmacopœia; the strong, corrosive mineral acids,—the adhesive fixed oils, &c. being estimated in the present edition, uniformly by weight; a decided improvement on the score of convenience, as well as of accuracy.

The process of displacement has received a degree of consideration and an extension of its application to which its now established and acknowledged value entitle it. Improvements also have been introduced which facilitate the operation, and at the same time render it more uniform and efficient in its results. For these improvements the Revising Committee are largely indebted to Mr. Israel J. Grahame of Baltimore, who presented to the American Pharmaceutical Association at its annual meeting in September, 1858, at Washington, an interesting and valuable paper on "the Process of Percolation or Displacement." In accordance with the views of Mr. Grahame, the substances to be subjected to displacement are directed to be in powder of determined fineness,—varying with the nature of the articles used.

The New Pharmacopœia establishes five grades of fineness for powders, which are ascertained and determined by their capability of passing respectively through sieves having 20, 40, 50, 60, and 80, or more, meshes to the linear inch. These five degrees of fineness are designated (in the same succession) by the terms "coarse," "moderately coarse," "moderately fine," "fine" and "very fine." This topic—the "Fineness of Powders"

—forms the subject of a new paragraph in the *Preliminary Notices*, and is treated of on page 7.

It would perhaps have better insured attention to these distinctions if the Committee had employed purely abstract or arbitrary terms to designate them; such for example as naming them after their limiting sieves—as "powder No. 20"—"powder No. 40," &c. But although the designations adopted are in themselves relative, and would probably convey different impressions to different persons, it must be borne in mind that whenever used in the new Pharmacopœia, they have specific and uniformly defined meanings. Much of the success of the operation of percolation depends upon the proper degree of fineness being attained in the substances to be operated upon; and the certainty of which can only be arrived at by a reference to an established standard. The Apothecary is earnestly besought therefore to give a faithful attention to this detail, which has been carefully marked by the Committee in all the different formulas where necessary, and which must be considered as embodying their most deliberate and well settled judgment in the matter. Unless these directions are carefully observed, satisfactory or uniform results cannot be expected. Once more, then, let the operator bear in mind that where a "moderately fine powder," for example, is directed, he is not to interpret the phrase according to his own judgment, as he would formerly have done, but is to understand it as a technical expression describing a powder which has been actually sieved through meshes of a fineness of fifty to the linear inch.

The word "Percolation" is used as a title or heading on page 8 of the *Preliminary Notices*, instead of the word "Filtration," as being more accurate and distinctive. Two kinds of percolators are directed to be used, according to the nature of the substance to be operated upon; namely the conical or funnel-shaped, and the cylindrical. Where the substance is liable to swell on being moistened, as for example Gentian, or Squill, the conical-shaped percolator is preferable. Where the substance is very light and open in its texture, as for example Arnica flowers, or Hops, a considerable compression is required, and in such case, the cylindrical percolator answers best. For many substances it is a matter of indifference which is used.

Wherever either one is to be preferred, it has been designated in the formula. *Glass* percolators have been indicated in all those formulas where iron would be acted upon chemically by the substances employed, except perhaps in the case of *Extractum Conii Fluidum*, where it has been accidentally omitted.

Preference has been given to the process of percolation in all cases where it is applicable; though in a few instances an alternative process by maceration has also been given.

The first Table (given at the end of the work) shows that fifty-five medicinal substances have been introduced into the Materia Medica;—forty-two of these being assigned to the primary list, and thirteen to the secondary list. Of these new additions, some of course are to be used directly, as medicinal agents, as for example Lini Farina, Lithiæ Carbonas, Spiritus Frumenti, Acidum Chromicum, &c. This last article, *Chromic Acid* is recommended as a valuable escharotic for the destruction of fungi and morbid growths; and also as a useful substitute for Nitrate of Silver in ulcerations of various mucous membranes. Others are to be used in the preparation of medicines, as Amylic Alcohol, used in the preparation of Valerianate of Soda which in turn is used in the preparation of Valerianic Acid, and this again in the preparation of Valerianate of Ammonia. While others again, though not possessed of any particular medicinal properties, are, from their extensive use in Pharmacy, very properly introduced,—such as Canna, Lycopodium, Saccharum Lactis, Vanilla, &c. Among the articles introduced into the Materia Medica list, are some that have previously been officinal. Thus *Phosphorus* was in the list of the Pharmacopœia of 1820; so was *Yeast*, under the name of "Cerevisiæ Fermentum;" while *Ferri Sulphuretum* was introduced among the "Preparations" in 1830, and dismissed in 1840.

New tests or standards of excellence have been added in several places. Thus Scammony must contain 75 per cent of its peculiar resin. Opium must contain sufficient Morphia to yield at least 7 per cent, by the officinal process for that substance. The Cinchonas, must yield at least two per cent of alkaloids capable of yielding crystallizable salts, &c.

The second Table shows that thirteen of the former primary list of the Materia Medica, and as many of the secondary list,

have been dismissed. Of these some have been superseded by others more eligible, and the remainder are seldom or never used. Thus Calamina is replaced by the Zinci Carbonas Præcipitata; Spongia was formerly used for the preparation of Spongia Usta. This preparation has become obsolete since the introduction of the compounds of Iodine. Sapo Vulgaris is no longer needed; it was used in only one preparation of the Old Pharmacopœia,—the "Linimentum Saponis Camphoratum" or Opodeldoc. This has been dismissed as an inconvenient preparation, and as possessing no advantages over the "Linimentum Saponis,"* of the present Pharmacopœia. Of the 26 names dismissed from the list, twenty-one have been officinal since 1820; two since 1830; two since 1840; and one since 1850. Two of the substances formerly in the *primary* list of the Materia Medica have been transferred to the *secondary* list; as is shown in the sixth table; namely "Calamus" and "Sabbatia." On the other hand, we see that eighteen articles have been promoted from the former *secondary* list, to the present *primary* list. In addition to which, the *primary* list is now made to embrace five medicines which were formerly included in the class of "Preparations."

The third Table shows that one hundred and eleven medicines have been added to the class of "Preparations" or to those combinations which may be, and most of which should be prepared by the dispensing Apothecary. The Preface gives a very excellent account of the principal changes made in the preparations, and of the reasons therefor. The alphabetical arrangement has been much more consistently carried out than in the preceding editions; the committee very properly classing all similar *preparations* together, rather than the various compounds of the same leading substance; thus placing "Liquor Iodinii Compositus" under Liquores, instead of under Iodinium, "Tinctura Ferri Chloridi," under Tinctura, instead of under Ferrum, &c.

Changes have been made in many of the specific gravities; some of these changes being merely the results of more perfect investigation, while others are the consequences of alterations

* This is the name now given to the "Tinctura Saponis Camphorata" of the old Pharmacopœia.

in the strengths of the preparations directed.* It is all-important that physicians should familiarize themselves with these new modifications of strength, and should carefully attend to these differences, in prescribing; and also that apothecaries should at once simultaneously and uniformly adopt the new formulas.

In many of the preparations, the changes are quite unimportant, and were introduced for the purpose of bringing certain products to even measures, or in some other way promoting uniformity with other allied preparations. *Acetum Opii*, for example, formerly contained 73·84 grains of Opium in each fluidounce, and the resulting product was three and a quarter pints. It now contains 75 grains in each fluidounce, which is exactly double the strength of the Tincture of Opium, and the resulting product measures two pints. In like manner, *Tinctura Guaiaci Ammoniata* formerly contained $2\frac{2}{3}$ troyounces of Guaiac in each pint; the resulting product being one and a half pints. It now contains 3 troyounces in each pint, which gives it exactly the same strength as the Tincture of Guaiac, and the product measures two pints.

In some cases, changes were rendered necessary by the adoption of the plan of weighing, instead of measuring the mineral acids. The *diluted* mineral Acids are all made weaker. *Acidum Muriaticum Dilutum*, according to the old formula contained about 2114 grains of muriatic acid in each pint. By the new formula it contains 1920 grains; which is a diminution of strength of about $\frac{1}{11}$. The former product was *nearly*, and is now *exactly* one pint. *Acidum Nitricum Dilutum*, formerly contained about 1479 grains of Nitric Acid in each pint; it now contains 1440; which is a diminution of about $\frac{1}{38}$. The product was formerly about seven fluidounces, and is now one pint.

* Where specific gravities are given the figures are always carried to three places of decimals, corresponding to grains where the 1000 grain bottle is used to determine them. In the old Pharmacopœia, they stopped sometimes with two places; thus, the sp. gr. of Nitric Acid was 1·42, it is now 1·420, not differing in point of fact, but merely carrying out the system. The sp. gr. of Sulphuric Acid was changed from 1·845 to 1·843, this being the strength of the best commercial article, and it being very difficult to procure a stronger acid.

Acidum Sulphuricum Dilutum, contains almost precisely the same weight of Acid in each pint that it did before; the variation being less than one grain; hence the only difference of strength in the two preparations results from the employment of acids differing slightly in strength; the acid required by the old formula having the sp. gr. 1·845, while that required by the new one has the sp. gr. 1·843. In this calculation no allowance has been made for condensation in the old formula, which would slightly increase the difference between the two preparations. The product was formerly about fourteen fluidounces; it is now one pint. *Acidum Sulphuricum Aromaticum* has the proportion of Sulphuric Acid diminished by about $\frac{1}{47}$, although in this formula the finished product has not been reduced to an even measure. *Acidum Nitromuriaticum* has the proportion of Muriatic Acid increased by $\frac{1}{49}$. For all medicinal purposes these changes will of course be imperceptible.

An *Acidum Nitromuriaticum Dilutum* has for the first time been introduced into the Pharmacopœia, as a preparation possessing several advantages over the stronger Acid just above referred to, of which it has just one-fourth the strength, and which it will doubtless, in almost every case beneficially replace. Among the merits of this new preparation may be mentioned, that it is one of more uniform strength; that presenting a larger bulk of water to the chlorine eliminated, it will of course retain in solution a larger proportion of that gas; that it will keep much better; and lastly, that it is much more conveniently dispensed, it being almost impossible so to secure the stronger Acid as to prevent leakage, and consequent damage to clothing or furniture with which it may come in contact. *Acidum Phosphoricum Dilutum* is another new preparation of the present Pharmacopœia; it has been prescribed here considerably, however, having been officinal in the London Pharmacopœia since 1836. An alternative process for preparing it from Glacial Phosphoric acid is given, based upon the results of experiments made by Mr. John M. Maisch for the Committee of Revision, and of which experiments an interesting account may be found in the American Journal of Pharmacy, vol. xxxiii. p. 385.

There are variations, however, in the strength of some of the

preparations which alter the usual doses considerably, and which should be very carefully noted both by the physician and the apothecary. Thus the *Syrupus Ipecacuanhæ* has now given to it double the strength of the former preparation. *Syrupus Rhei* is now fifty per cent. stronger than it was in the old Pharmacopœia. These changes have been long called for and are both of decided advantage. A new formula for *Extractum Valerianæ Fluidum* has been given, the only menstruum used being alcohol; whereby a more satisfactory product is obtained; at the same time the strength of the preparation has been doubled, in conformity with the general rule for Fluid Extracts. *Emplastrum Picis cum Cantharide* has been made weaker, in consequence of frequent complaints that blisters had been produced by its use. It formerly contained one-eighth of its weight of Cerate of Cantharides. It now contains only one-thirteenth. *Spiritus Menthæ Piperitæ*, and *Spiritus Menthæ Viridis* were heretofore inconveniently strong; they contained according to the old formulas, one fluidounce of the respective oils in each nine fluidounces of the spirit. They now contain one fluidounce in each pint. The strength of *Liquor Plumbi Subacetatis Dilutus* has been increased fifty per cent. *Oleum Æthereum* has been reduced in strength one half, by the addition to it of an equal volume of stronger Ether, which addition is made for the purpose of preserving it. In the preparation of *Spiritus Ætheris Compositus*, double the quantity of this oil is used; consequently the preparation is of the same strength as before, though apparently of double strength. *Vinum Rhei* has been slightly increased in strength; the finished product having been changed from eighteen fluidounces to a pint, while the active ingredients remain unchanged in quantity.

We shall have time only to glance at some of the principal innovations, of preparations, or of improved processes introduced in the present edition of the Pharmacopœia. *Bismuthi Subcarbonas*, a new preparation, is recommended as a substitute for the Subnitrate of Bismuth; as it possesses all the efficacy of the last named salt, and has the additional advantage of being antacid. *Bismuthi Subnitras*, is itself prepared by a new and improved process, the result of much laborious investigation and careful experiment, which have obtained a very satisfactory product. Each

of these two preparations of Bismuth is almost entirely, if not absolutely free from Arsenic. Ceratum Sabinæ is prepared by an improved process, which consists, (instead of mixing the powdered Savine with cerate as formerly) in making an ethereal extract of the Savine and mixing this with the resin cerate, whereby a much more efficient and beautiful preparation is obtained. *Ceratum Extracti Cantharidis* is prepared on the same principle as the cerate last named, and is designed as a substitute for the well known *Ceratum Cantharidis*. It is recommended as being more efficient, more cleanly, and a more elegant preparation.

Of the various new solid extracts added to the former series, it may be mentioned that *Extractum Arnicæ Alcoholicum* has been introduced for the purpose of preparing therefrom Arnica Plaster, which has lately been much used. *Extractum Cannabis Purificatum* is adopted for the purpose of rendering the *Extractum Cannabis* of the Materia Medica list more uniform in strength. It is from this purified extract of hemp, that the *Tinctura Cannabis* (a new preparation) is directed to be made, whereby its uniformity is also better secured.

A criticism is here suggested upon the names given to the *Extractum Cannabis* and to the *Extractum Dulcamaræ*. According to analogy each of these preparations should have the word "*Alcoholicum*" affixed to its title. These two being the only solid *alcoholic* extracts which are not so designated. The former is defined to be an alcoholic extract; the latter is made like *Extractum Colcynthidis Alcoholicum*, and *Extractum Senegæ Alcoholicum*, both of which have the word "*Alcoholicum*" added to their names. All the other solid extracts (not designated as "Alcoholic") are aqueous, either wholly, or in part.

The class of "Fluid Extracts," embraces the largest number of additions made to the new Pharmacopœia. There were formerly but five officinal fluid extracts, exclusive of fluid extract of Cubebs and fluid extract of Black Pepper, which are now called Oleoresins; there are now twenty-five, in other words, twenty new ones have been introduced. Of the whole number, fifteen are alcoholic, and ten are saccharine. Two of this latter class, namely, Fluid Extracts of *Bittersweet* and *Uva Ursi* would probably be better preparations if *they* were alcoholic.

All of the fluid extracts except two, are of such strength that each fluidounce exactly represents a troy ounce of the substance from which it is obtained. These two exceptions are *Extractum Cinchonæ Fluidum* and *Extractum Pruni Virginianæ Fluidum*, which are made of only half the equivalent strength, owing to the difficulty of obtaining a satisfactory product, if attempted to be made more concentrated.

The rule may therefore now be regarded as established, that fluid extracts should be made of *equivalent* strength: that is, ounce for ounce, excepting when there is a good reason for variation; and then they should uniformly be half as strong. It would be well if those who frame formulas for new fluid extracts (for there will doubtless be many more officinal hereafter) would conform to this precedent.

Fluid Extracts of *Buchu*, *Cimicifuga*, and *Bittersweet*, have been much used of late years, and are very properly introduced into the Pharmacopœia. If any should doubt the propriety of introducing such potent fluid extracts as those of *Colchicum Root*, *Colchicum Seed*, *Hemlock*, and *Henbane*, it should be considered that they are all in use, and it is much better to have a uniform and established formula for their preparation, than to leave it to the judgment of the apothecary, who may have occasion to make them. In proper hands they will without doubt prove valuable medicines. The fluid extract of *Ergot* is perhaps the best preparation of that valuable drug, as well on account of its permanence of character, as of its activity in practice. The Fluid Extract of Cinchona, though by no means an elegant preparation, (it being necessary always to shake the bottle well before dispensing the extract contained in it,) is still a valuable remedy, containing all the medicinal properties of the Yellow Cinchona in a convenient and concentrated form.

The formula for Fluid Extract of *Rhubarb* has been advantageously modified. In the first part of the process, strong alcohol is used as the solvent, whereby a tincture is obtained that can easily be concentrated without danger from over exposure to heat. The quantity of sugar has been diminished, whereby the extract is rendered more fluid, while there is still enough left to

make the preparation keep well. The aromatics have been omitted, for the convenience of making the "Syrup of Rhubarb." When used in prescriptions, it will be very easy for the prescriber to add such aromatics as he may think agreeable. The aromatics have also been omitted from the Fluid Extract of *Senna*, which is used in making *Fluid Extract of Spigelia and Senna.* The *Fluid Extract of Ipecacuanha* will be found a very useful preparation for prescription purposes, as well as for preparing the *Syrup of Ipecacuanha.*

Two preparations of pills have been made officinal, which have long had a considerable reputation; one, the *Pilulæ Aloës et Mastiches*, a useful combination, long known as "Dinner Pills" or "Lady Webster's Pills," and made officinal in the Paris Codex, A. D. 1758, under the title "*Pilulæ Stomachicæ*"; the other, the *Pilulæ Antimonii Compositæ*, which name is given to an old preparation, familiarly known as "Plummer's Pills," or the "Compound Calomel Pills" of the British Pharmacopœia.

We feel inclined here to make a criticism on the quantities in which the pills of the Pharmacopœia are directed. It will be admitted by every Pharmaceutist that the numbers called for by the different formulas, are generally exceedingly inconvenient for division, in their practical preparation. In almost every instance the apothecary is required to make a division of the pill mass into 3 or 5 parts. Of the seventeen "pill" formulas, *one* requires 60 pills; *one* requires 80 pills; *two* require 120 pills; *two* require 180 pills; *one* requires 200 pills; *five* require 240 pills; *one* requires 300 pills, and *four* require 480 pills. It is evident from a mere glance at these numbers, that the value of the troy ounce (and its divisions) has had a controlling influence over them. Had the "grain scheme," urged in the xxxii. vol. of this Journal (p. 102,) and already referred to, been adopted, (the troy scale being entirely ignored, and all weights being computed in *grains* up to the commercial or Avoirdupois *pound*,) there would have been no difficulty in selecting such quantities as would be most convenient to the compounder, and he alone can have any interest in the precise number of pills to be manufactured at one operation. A *rational* system of this

kind would have given us 64 instead of 60; 128 instead of 120; 256 instead of 240; and 512 instead of 480. In short, as recommended in the article alluded to, all the pills of the Pharmacopœia would have been stated in *even* multiples of 24 or of 16, or preferably in only *binary* multiples of these numbers. This may appear to some, a rather trifling matter, but we are satisfied that the practical convenience of such a system, would be found to be by no means trivial.

The two very popular effervescing powders, the "Soda" and the "Seidlitz," have been adopted into the family of legitimate preparations, under the names of *Pulveres Effervescentes*, and of *Pulveres Effervescentes Aperientes*. It is only surprising that they have not been made officinal before this.

Two very characteristic classes, namely, the *Resinæ*, and the *Oleoresinæ* have been added to the preparations. The former class comprises the new and valuable articles of *Resina Jalapæ*, *Resina Podophylli*, and *Resina Scammonii*, which will be found concentrated and convenient remedies. The latter class adds to the Oleoresins of *Cubeb* and of *Black Pepper* (formerly designated as "Fluid Extracts") the new ones of *Capsicum*, *Lupulin* and *Ginger*.

Among the new Syrups added to the list, *Syrupus Lactucarii* may be mentioned as a concentrated and useful preparation of this valuable drug. Physicians should bear in mind that this syrup contains 60 grains of Lactucarium in each fluidounce; and that it is a very different preparation from the one extensively prescribed under the title of "Aubergier's Syrup," which contains only about two grains of Lactucarium in each fluidounce.

By the fourth Table it is seen that thirty-seven of the former preparations have been dismissed from the present Pharmacopœia; some of them being superseded by better preparations, as for example "Ferri Iodidum," which is replaced by "Pilulæ Ferri Iodidi;" or "Ceratum Calaminæ," for which we have a substitute in the "Ceratum Zinci Carbonatis;" others have been dismissed as being inferior to other preparations possessing the same remedial properties; as for example, the "Extractum Aconiti" is entirely replaced by the "Extractum Aconiti Alco-

holicum;" the "Syrupus Sennæ" possesses no advantage over the "Extractum Senna Fluidum" which for several reasons is a better preparation; and others being discarded as having been found to be of little or no value, which may be said of the great majority of articles dismissed.

The fifth Table presents in one view the changes which have been made in the Latin Officinal names of many of the substances and preparations still retained. In a few instances, a single name has been adopted, to include two or more names of the old Pharmaopœia; as *Erigeron,* simply, for "Erigeron Heterophyllum" and "Erigeron Philadelphicum:" *Ferrum,* in place of "Ferri Filum" and "Ferri Ramenta:" *Rubus,* in place of "Rubus Trivialis" and "Rubus Villosus." In other cases on the contary, distinctions have been introduced, not before marked. Thus in the place of the old "Aloe," we now have three distinct varieties of *Aloe,* recognised. Instead of "Aurantii Cortex," we have the *sweet* and the *bitter* Orange, distinguished. In the place of "Sinapis," we have the *white* and the *black* Mustard. The *Cyanurets* have been changed in accordance with the more approved nomenclature into *Cyanides.* It would have added to the uniformity of the terminology if the *Sulphurets* had also become *Sulphides.*

Changes have also been made in many of the English names, which have not been placed in the form of a table. Preferring the abstract to the concrete, the Committee have employed the name in the singular number instead of the plural, whenever it was thought to be allowable: giving us the words *Almond, Cubeb, Fig, Prune, Rose,* &c., in place of *Almonds, Cubebs, Figs,* &c.. In many cases the Latin or technical name of an article has become so familiar, (such as *Arnica, Calamus, Cinchona, Digitalis,* &c.,) that the Committee have done well in naturalizing the name at once as the English one, and thereby dispensing with various uncouth and objectionable designations.

Much confusion and uncertainty have heretofore prevailed in relation to the proper classification and nomenclature of the various solutions, aqueous and alcoholic, required by the Pharmacopœia. The Committee have done much toward giving simpli-

city and uniformity to this important matter in the present edition; and the result of their deliberations has been to transfer several of the "Solutions" to the "Waters;" and several of the "Tinctures" to the "Spirits." The improvement cannot, however, as yet be regarded as being perfected; and the definition attempted on page xiv. of the preface (near the bottom of the page,) that the committee were disposed to consider "all aqueous solutions of gases or of volatile substances as belonging to the class *Aquæ*" restricting "the term *Liquores* to solutions of non-volatile substances," can hardly be accepted as strictly accurate. Few, for instance would regard *Liquor Arsenici et Hydrargyri Iodidi* as an "Aqua," although it is an aqueous solution of volatile substances, (Iodide of Arsenic, and Red Iodide of Mercury;) nor would any one probably be disposed to question its right to be considered a "Liquor."

Perhaps the best definitions of these varying solutions, where precision is confessedly difficult, would be to consider the term Aquæ as embracing the class of aqueous solutions of volatile oils and their congeners, (by which is meant such articles as Camphor or Creasote,) or of the gases. This definition would change the long established nomenclature of *Acidum Muriaticum*, and of *Acidum Hydrocyanicum Dilutum*, as well as of the newly introduced *Acidum Hydriodicum Dilutum*, and *Acidum Sulphurosum* which would become respectively "Aqua Acidi Muriatici Fortior," (corresponding to *Aqua Ammoniæ Fortior*,—the diluted Muriatic Acid becoming "Aqua Acidi Muriatici,") "Aqua Acidi Hydriodici,"—and "Aqua Acidi Sulphurosi." Consistency would seem to require these alterations.

"LIQUORES" should be understood to embrace all aqueous solutions of solid substances perfectly soluble, exclusive of those coming under the class "Aquæ." The observance of this definition would remove the *Solution of Gutta Percha* from the "Liquores,"—it not being an aqueous solution. Aqueous solutions of *liquids*, excepting the volatile oils should of course be regarded simply as "dilutions."

"SPIRITUS" should embrace alcoholic solutions of volatile oils and their congeners, or of gases.

"TINCTURÆ" should be limited to alcoholic (or hydroalcoholic) solutions of animal and vegetable substances not entirely soluble. *Partial* solubility (or the solution of a part, or of extractive matter) seems to be involved in the very idea of a *tincture*, and if this were made the essential characteristic of the class, various preparations, now called "Tinctures" would have to be excluded therefrom, on the ground of being complete solutions of entire substances. *Tinctura Ferri Chloridi*, for instance, the *Tinctura Iodinii*, and Tinctura Iodinii Composita, together with such similar preparations as may hereafter be formed, should clearly constitute a distinct class of *Alcoholic Solutions* (the analogues of the *Liquores*,) designated by a common name, such as "Solutiones" or "Soluta," employing "Solutum" as a noun.*

In like manner, preparations in other solvents, such for instance as *Ethereal Solutions*, should be separated into appropriate classes.

These views were partially acted upon by the Committee, and hence we have *Aqua Ammoniæ* in place of the former *Liquor Ammoniæ;* a return, by the way, to an old and discarded name. So the former *Tinctura Camphoræ* has now become Spiritus Camphoræ, &c.

In reviewing the history of some of these preparations, it is curious to note the fluctuations of nomenclature to which they have been subjected. *Aqua Ammoniæ*, which was officinal in the Pharmacopœias of 1820 and 1830, became Liquor Ammoniæ in the edition of 1840, remained so in the edition of 1850, and in the present edition is restored as above intimated. *Tinctura Menthæ Piperitæ* was officinal in the Pharmacopœia of 1820, was dismissed from the Pharmacopœia of 1830, was restored in the edition of 1840 under the name of *Tinctura Olei Menthæ Piperitæ*, remained with the same name in the edition of 1850, and is now changed to *Spiritus Menthæ Piperitæ*. The *Spiritus Menthæ Viridis* shared the same fortune. Tinctura Camphoræ was officinal in the Pharmacopœias of 1820, 1830, 1840, and 1850, and is now christened *Spiritus Camphoræ*. In the London

* We have Infusum instead of Infusio.

Pharmacopœia, this preparation has had a still more varied history. It was officinal in 1721 as *Spiritus Vini Camphoratus;* in 1746 it became *Spiritus Vinosus Camphoratus;* in 1788 it became *Spiritus Camphoratus;* in 1809 it became *Spiritus Camphoræ*, and retained this name in the revision of 1824, having been designated as a "Spirit" throughout this whole period. In 1836 it became *Tinctura Camphoræ*, being for the first time called a "Tincture," and finally, in 1851, it received back its former name of *Spiritus Camphoræ*.

The work before us furnishes several examples of return to old and discarded names. *Ferrum* which was officinal in 1820, was displaced by the *Ferri Filum*, and *Ferri Ramenta*, of the edition of 1830, which after a reign of three decades, have in turn given place to *Ferrum*. *Potassæ et Sodæ Tartras*, was the officinal title of this compound salt in the Pharmacopœia of 1820, which after having been changed in 1830 (for some reason which does not appear) to *Sodæ et Potassæ Tartras*, has now been restored to its former name. So with some of the English synonymes of the Latin names; thus "Spanish Flies" which was the English name introduced into the Pharmacopœia of 1830, replaced the English designation "Cantharides" of 1820, which designation is now reinstated. *Fœniculum* was translated "Fennel" in 1820, "Fennel Seed" in 1830, and now once more "Fennel."

These and similar changes of nomenclature, slight and arbitrary as they may appear, were not made without mature deliberation, and were in every case prompted by a careful attention to certain general principles, and an earnest desire to give greater unity and scientific method to the work, without regard to the past variations of officinal names.

But one more feature of the new Pharmacopœia can be alluded to at present, to wit, the improvement of having all the Latin or officinal names so marked in the general index to the work, as to constitute it a pronouncing vocabulary of the Materia Medica. This new facility was adopted by the Convention, at the instance of the New York College of Pharmacy, through Mr. Meakim. The plan is certainly a good one, though there may possibly be some question as to the precise force of the notation employed.

For example, such words as Acácia, Bárii, Cerátum, Digitális, Dulcamára, Gentiána, Jalápa, Mucilágo, Sinápis, Tabácum, Valeriána, Verátria, &c., have the accented *a* marked on top with a long mark, which would doubtless cause the English reader to pronounce the words as if written Acáycia, Báyrii, Ceráytum, Digitáylis, &c., or to give the *a* the sound it has in the word "nature." We believe that by the universal practice of classical scholars throughout Europe, and we think by the usage of a majority of those of this country, the *a* is pronounced in all such words as it is in the word "nătural."

There is some little confusion prevalent between what is called a long or a short *vowel* sound, and a long and a short *syllable*. The vowels a, e, i, o, and u, are each said popularly to have a *long* and a *short* sound, though every vowel sound has intrinsically the same length. In poetry every accented syllable is called a long syllable, whatever its vowel sound. Thus the words Materia Medica have the "e" syllable accented, and therefore long, although in the second word the "e" is called short.

"Aconītia" and "Spīritus" are marked as if the "i" were to to be pronounced "long," as it is called.

We cannot close without alluding to the very neat and remarkably cheap form in which the publishers (Messrs. Lippincott & Co.) have produced the work. We think the views of the Convention could not have been more thoroughly carried out. This novel form of the work is in accordance with a suggestion of Mr. Procter, (universally approved) in order that a general use of the work by physicians and apothecaries might be promoted. There can be no excuse now for any respectable physician or pharmaceutist in the country being unprovided with the great authoritative text-book of his profession; and we cannot too earnestly urge upon all of either profession the importance of possessing a copy, and of carefully and faithfully conforming to its provisions.

And we would advise all who may feel disposed to criticise either formulas or nomenclature, to make notes of their objections; that they may be fully and fairly considered in the preparation of the next decennial revision.

A NEW ASSAY BALANCE.

Mr. Dubois communicated the following remarks on assay-balances:

The recent receipt of two assay-beams at the Mint, procured for the use of Dr. Munson, assayer of the new branch Mint at Denver, in the Territory of Colorado, furnishes occasion for a few remarks on the progress of this delicate branch of art.

Thirty-one years ago, when Mr. Eckfeldt, the present assayer of the Mint, entered upon that office, he found that the beam on which all his operations were to turn, would not itself turn with a less weight than about the one-fiftieth part of a grain. Consequently, the nearest report of the fineness of gold was by gradations of one thirty-second ($\frac{1}{32}$) part of a carat, which was about $1\frac{3}{10}$ thousandths, according to the present notation. The reports of the British assayers were not in those days more exact, whatever their apparatus might have been.

About three years later, Mr. Peale brought from Paris, for the use of the Mint, a beam of superior finish and much greater delicacy; in which, among other improvements, stirrups were substituted for silk cords, although there was still a cord for lifting.

Two years farther on, we had Mr. Saxton restored from England to his own country, and employed in the Mint in this branch of art, in which he had already become famous. Various decided improvements were introduced by him, in the beams made for the Mint and Branch Mints.

After this artist had been claimed by Prof. A. D. Bache, for the Bureau of Weights and Measures, and was transferred to Washington, our assay department had recourse to the manufactory of Oertling, in London. His beams, although rather complicated, and of many parts, are admirable for delicacy and beauty, and for a combination of the most desirable qualities.

The establishment of the Branch Mint, already referred to, made a fresh call for assay balances. We were about to resort to the last named maker, when Dr. Torrey, of the United States Assay Office at New York, made a favorable mention of the manufactory of Becker & Son, at Brooklyn, from his own experience of what they could do. Any less authority would perhaps have been held insufficient, on the narrow but venerable

principle of questioning whether "any good thing can come out of Nazareth." The order was consequently given by Gov. Pollock, director of the Mint; and in a very short time two balances, with sets of weights, were made and delivered at the Mint.

It is not at all the purpose of this notice to enter into a detailed description of the parts and peculiarities of the different kinds of assay-beams. There is nothing like an actual inspection of them, to give a just idea of their merits; and persons who take a special interest, can easily have the opportunity. Suffice it to say, that this instrument compares favorably with any other, in respect to delicacy, philosophic propriety, good taste, and fine finish. In respect to simplicity and stability, two very important features, it may be said to excel.

There is one point of considerable account, in regard to this beam,—that its cost is about one-third the London make, namely, seventy-five dollars against two hundred and twenty-five, counting the present cost of a bill of exchange. It is difficult to understand how the Messrs. Becker can do justice to themselves, at such a price. And not only was there a saving of money, but of time also.

There is one other point worthy of a few words,—that we have here a further development of the progress of delicate workmanship in our own country. We proceed from clocks to watches, from reapers to penknives. And in regard to philosophical apparatus, if we may introduce names, it is well known, that our Ritchie, at Boston, has so improved upon Ruhmkorff, of Paris, in the powerful induction-coil (the most splendid instrument of the day), as to entitle it to be called by his own name, and to be counted *American.*

It should be stated, that the balance will indicate the tenth of a thousandth of the demi-gramme, which is our normal weight in the gold assay; that is, it will turn with $\frac{1}{1300}$th part of a grain. As the beam and appendages are quite heavy, and capable of bearing twenty times the largest weight ordinarily used, it might be made much more sensitive by lightening the parts; but for working purposes, this is not desirable. Such a sensibility would serve to gratify curiosity, or to make a boast of, but would not be in keeping with the amount of deviation which is to be

expected in other parts of the assay—the cupellation and parting. It would be too much like the exquisite refinement of some who report specific gravities: their apparatus carries them safely to the second decimal, but their arithmetic extends to the fourth or fifth.—*Prac. Amer. Phil. Soc. May* 15, 1863.

CINCHONIA—ITS VALUE IN MEDICINE.

By John Eliot Howard.

I notice in the May "Pharmaceutical Journal" a letter of Dr. Daniell's, from Kingston, Jamaica, stating that his experience in the treatment of febrile diseases was unfavorable to cinchonine, in consequence of the cerebral disturbance which it occasioned. It is remarkable that these results of West Indian experience should be so entirely opposed to those obtained in practice in the East Indies, as treasured up by Dr. Macpherson, Presidency-Surgeon, whose work on Quinine and Antiperiodics (published at Calcutta in 1856) is by far the most original and valuable that has fallen under my notice in the English language.* Dr. M. states that cinchonine has been found, after numerous experiments on animals, and long observation on man, to produce in its state of sulphate *effects precisely analogous to those of quinine;* it causes the same cerebral disturbances and the same degrees of them, a period of excitement and of sedative action respectively; its contact with the digestive tube is neither more nor less irritating than that of quinine, only its power is less by about one-third; it is absolutely certain that cinchonine is as good a febrifuge as quinine; M. Forget has indeed reported unfavorably on cinchonine; but Dr. Hudellet, of Bourg, in 503 cases found no inferiority to quinine; this was the result in Holland with Basting and Pereira; and most authors consider cinchonine very little inferior; Dr. Macpherson therefore strongly urges the Government of India to substitute cinchonine for quinine.

Briquet's great work, the result of eleven years of continuous

* By referring to Dr. W. F. Daniell's remarks published in the last Journal, it will be seen that his remarks refer to the use of Cinchonine in Western Africa, and not in the West Indies, as here stated.—Ed. Ph. Journ.

experiment and observation, bears similar testimony to the efficacy of cinchonine. He says that cinchonine produces nearly the same effects as quinine, with the exception of confusion of sight, of which he never saw a trace. He says that it results from his experiments that the power of sulphate of cinchonine is a third or fourth weaker than that of bisulphate of quinine. This result, he observes, is in accordance with what has been observed by others, who have been obliged to give sixty to eighty centigrammes of cinchonine, with the addition of acid, to arrest fevers which would have been cut short with a dose of forty to fifty centigrammes of sulphate of quinine at the most. He thinks that nevertheless there would be advantage in employing cinchonine on economical grounds, and that there would be no inconvenience to the patients, because its local exciting effect and its bitterness are less than in the salts of quinine. (*Traité Therapeutique du Quinquina*, pp. 991, 174, 468, Paris, 1853.)

It seems, however, that the question is not yet set at rest, and it is surely desirable that it should be pressed upon the attention of the medical world until some certain conclusion is universally adopted. It must not be forgotten that it was only after a long and severe struggle with prejudice that Peruvian bark, in any shape, was admitted in medicine.

My own experience in a large number of cases, treated gratuitously, has not presented any feature of marked difference in effect from the other alkaloids of bark. It certainly cures the agues of this country; but I do not pretend to speak minutely of its effects as distinguished from those of quinine. It is the more important to decide the question of the value of cinchonine, because several of the species of cinchona cultivated in India must be estimated as useful or worthless according to this criterion—*Lond. Pharm. Journ.*, *June*, 1863.

ACTION OF NASCENT HYDROGEN ON ALDEHYDES.

It is known that MM. Wurtz and Friedel have converted several aldehydes into the corresponding alcohols by means of nascent hydrogen. They were unable to effect this change with the gas obtained by the ordinary methods of converting nitro-

benzol into aniline, but they succeeded by using an amalgam of sodium.

It has occurred to M. Lorin* to effect this change by means of hydrogen obtained by the decomposition of water, at a moderately elevated temperature, by zinc in the presence of ammonia—the means by which M. Berthelot converted acetylene into ethylene. He has found that this may be done, that aldehyde and acetone are respectively converted into the corresponding alcohols, and that, in the case of aldehyde, this change is also accompanied by the production of ammoniacal compounds.

Dry aldehyde-ammonia was placed in contact with a water solution of ammonia and small fragments of zinc. The disengagement of hydrogen took place under slight pressure, and at a temperature of from 30° to 40° C.

After filtering the liquid, and distilling off one-half, the distillate was saturated with dilute sulphuric acid, then again distilled from a water bath, and one-fourth collected. Carbonate of potash caused the separation of an inflammable liquid, decomposable by sulphuric acid with production of olefiant gas, and yielding with acetate of soda and sulphuric acid, acetic ether; in short, possessing all the characters of ordinary alcohol.

Acetone, carefully purified and treated in the free state in the same manner, gave rise to the production of propyl alcohol.

The quantities of the alcohols thus obtained did not amount by weight to more than one-fifth of the quantities that should have been obtained if the conversion had been complete. Accessory products were formed by the action of the nascent hydrogen, either on the aldehydes or on the alcohols.

In the experiment with aldehyde, the residue, saturated with potash and carefully distilled into hydrochloric acid, gave a crystalline deliquescent salt, soluble for the most part in absolute alcohol, and evolving an inflammable alkaline vapor when mixed with lime.

Nitrobenzol, treated in the same manner as above, was converted into aniline.—*Chem. News, Lond., May 23d*, 1863.

* Comptes Rendus, lvi., 845.

QUANTITY OF AIR INDISPENSABLE FOR RESPIRATION DURING SLEEP.

M. Husson* remarks, in reference to the note on this subject by M. Delbuck,† that if the majority of animals seek retired places in order to sleep, their object is merely the same as that of a man who locks his bedroom door. If the soldier sleeping in the open air covers his head with a cloak, it is chiefly with the object of protecting himself from cold. The reaper or haymaker, when resting, merely seek the shade, and do not cover their faces unless it be for the purpose of keeping away insects. At the same time it must be remembered that even in a waking state man sometimes finds it necessary to cover his face. The fact that children cover their heads with the bed-clothes before going to sleep is rather the exception than the rule, and those who do so instinctively throw off the covering during sleep.

There is no doubt that it is possible to exist for a brief time in a vitiated atmosphere, but it is not possible to continue in such an atmosphere without prejudice to health.

As for birds, who tuck their heads under their wings before sleeping, they at the same time place their beaks so that air has free access.—*Chem. News, Lond., May*, 1863.

ON THE ACTION OF CHLORIDE OF ZINC ON SILK.

By M. J. Persoz, Jr.

Silk rapidly dissolves in a hot concentrated solution of chloride of zinc, and more slowly in a weak and cold solution.

But though chloride of zinc readily dissolves silk, it does not destroy the texture of wool nor vegetable fibres, so that, by means of this re-agent, the complex nature of certain tissues can now be more easily distinguished. Thus, the silk may be dissolved by chloride of zinc, and the wool destroyed by soda, so as to leave only the vegetable fibres. The sample of wool and silk tissue which I have presented to the Academy, a portion of which has been immersed in chloride of zinc, will give an exact idea of this reaction.

* Comptes Rendus, lvi., 127. † Chemical News, vii. 221.

The solvent I employed was chloride of zinc, concentrated to about 60° by the areometer. This had been kept boiling with excess of oxide of zinc till it became sensibly neutral to litmus paper. It is then a basic chloride, which, indeed, is slightly troubled on the addition of distilled water, but has the advantage of causing no alteration in vegetable tissues, which may have to be isolated in the course of the experiment.

On contact with chloride of zinc, the silk is converted into a gummy mass, preserving at first the form of the threads of the tissue, but changing gradually to transparent clots, and finally becoming completely dissolved.

Chloride of zinc at 60° gradually dissolves considerable quantities of silk, but under the influence of heat the solution will be effected in a few instants, becoming viscous and threading like a thick syrup. It then resembles a concentrated solution of gum arabic. Ammonia produces in the weak solution, diluted with water, a white precipitate, which dissolves completely in an excess of re-agent.

Being in solution in chloride of zinc, I tried in vain to separate the silk from its solvent by ordinary chemical agents, till, at last, M. Graham's dialyser occurred to me.

I first diluted the silk solution by pouring it into water acidulated with hydrochloric acid. This acid prevents the formation of the precipitate of basic chloride of zinc referred to previously, which water simply would induce.

In a former experiment I twice filtered the solution without getting rid of its slightly opalescent appearance, and I placed it in this state on the dialyser. A larger quantity of chloride of zinc passed directly, and after a few hours the liquid had become much more viscid; then it increased in volume and formed into an opaline jelly, resembling starch. This jelly contained yet a little chloride of zinc, which could not be separated on account of the new physical condition of the matter. It had the insipid taste and smell of starch, while its chemical characteristics were dissimilar. In fact, it did not puff up with caustic potash, nor liquefy with sulphuric acid. Soluble in acetic acid as steeped starch, yet if dried it no longer dissolves in this re-agent, being transformed into vitreous and brittle fragments. But I have found it to possess one singular property: evapor-

ated to dryness in a thin layer in a platinum capsule, then carefully and gradually heated, it yields a vivid gooseberry-red matter, similar in color to murexide. The color thus formed has, however, no stability. As the reaction is produced at a very high temperature, nothing up to this point indicates the animal nature of the product. Not until the temperature reaches dull red does the matter completely decompose and disengage the disagreeable odor of torrefied silk.

In the following experiments I prevented the formation of this kind of fibrine starch by diluting the solution with more water before submitting it to the action of the dialyser, and especially by heating it for a few instants, which effects the removal, by filtration, of the matters in suspension, to which is due the opaline appearance of the liquid.

With these precautions, and by means of the dialyser, all the chloride of zinc can be separated, and a limpid, colorless, and insipid liquid obtained, which, by evaporation, gives a gold-colored, friable varnish.—*Chem. News, Londons, March* 7, 1863, *from Comptes-Rendus.*

SOLDERS.

Soldering is the art of uniting the surfaces of metals together by partial fusion, and the insertion of an alloy between the edges, which is called solder, it being more fusible than the metals which it unites. Solders are distinguished as hard and soft, according to their difficulty of fusion. Hard solders usually melt only at a red heat, but soft solders fuse at lower temperatures. In applying solder it is of the utmost importance that the edges to be united should be chemically clean—free from oxide—and they should be protected from the air by some flux. The common fluxes used in soldering are borax, sal ammoniac, and rosin. Hard silver solder is composed of four parts of fine silver and one of copper, made into an alloy and rolled into sheets. It is quite difficult of fusion. Soft silver solder is composed of two parts of silver, one part of brass, and a little arsenic, which is added at the last moment in melting them. It will be understood that these alloys are commonly run into

convenient bars or strips for use. Silver solders are used for soldering silver work, gold, steel, and gun-metal. A neater seam is produced with it than with soft solder. It is commonly fused with the blow-pipe. A strip of thin silver solder is laid on the joint to be closed, the blow-pipe is brought to bear upon it, when it melts and runs into the joint, filling it up completely. Button solder is employed to solder white metals, such as mixtures of copper and tin. It is composed of tin ten parts, copper six, brass four. The copper and brass are first melted, then the tin is added. When the whole is melted the mixture is stirred, then poured into cold water and granulated, then dried and pulverized in a mortar for use. This is called granulated solder. If two parts of zinc are added to this alloy, it makes a more fusible solder. Fine gold cut into shreds is employed as a solder for joining the parts of chemical apparatus made of platinum. Copper cut into shreds is used as a solder for iron. Hard silver solders are frequently reduced to powder, and used in that condition. Soft solder consists of two parts of tin and one of lead. An excellent solder is made of equal parts of Banca tin and pure lead. It is used for soldering tin plate, and, if well made, it never fails. The following is a useful table of solders with their fusing points:—

No.	Parts of Tin.	Lead.		Melting deg. F.
1	1	25		558
2	1	10		541
3	1	5		511
4	1	3		482
5	1	2		441
6	1	1		370
7	1½	1		334
8	2	1		340
9	3	1		356
10	4	1		365
11	5	1		378
12	6	1		381
13	4	4	1 Bismuth	320
14	3	3	1 "	310
15	2	2	1 "	292
16	1	1	1 "	254
17	1	2	2 "	236
18	5	3	3 "	202

The alloy No. 8 is used sometimes for soldering cast-iron and

steel; the flux used for this purpose is sal-ammoniac, but common resin may be employed. Gold and silver are sometimes soldered with pure tin and a flux of resin. Copper, brass, and gun-metal are soldered with No. 8 and a flux of resin or sal-ammoniac. The chloride of zinc is used for soldering sheet and plate iron as a flux with the same solder. Lead and tin pipes are soldered by plumbers with Nos. 6, 7, and 8 and a flux of resin and sweet oil. In soldering with soft brass, the ends of the article to be soldered are secured together by a wire, and granulated solder and powdered borax are mixed in a cup with a small quantity of water, and spread along the joints with a spoon. The article is then placed in a clear fire, and the solder melts at a bright red heat, when the article is then removed from the fire. In soldering small articles with the blow-pipe, they are supported on a piece of charcoal, or, what is better, pumice-stone, and the flame is ejected upon the solder. In soldering lead pipes, the parts to which the solder is not to be attached are usually covered with a mixture of lamp-black and size. In soldering any articles care must be exercised to have the edges of the plates or articles perfectly clean, or the solder will not adhere. A flux is employed for the purpose of preventing oxidation. Resin and sal-ammoniac, powdered and mixed together, make a good flux for copper and sheet-iron soldering. In other cases, a strong solution of sal-ammoniac is used to moisten the edges of the joint, then the resin is sprinkled upon it, and the solder applied. The chloride of zinc is made by dissolving pieces of zinc in muriatic acid. It is well adapted for soldering zinc plates and pipes, and is applied with a brush to moisten the edge of the article to be soldered. The solder is then applied in the usual way with a tool. Zinc is a very difficult metal to solder, because it is so easily coated with oxide, and it also volatilises with heat.—*Chem. News, London, March* 7, 1863.

ON THE PREPARATION AND PROPERTIES OF METALLIC RUBIDIUM.

Bunsen has prepared metallic rubidium, by igniting in a proper apparatus the carbonized bitartrate of the oxide. From 75 grammes of the salt, 5 grammes of metal were obtained in a

single mass. Rubidium is very brilliant, like silver, white, with a scarcely preceptible tinge of yellow. In the air it oxydizes instantly to bluish-grey suboxyde, and takes fire, after a few minutes, much more easily than potassium. At $-10°$ C. it is still as soft as iron: it melts at $58°.5$ C., and below a red heat is converted into a blue vapor with a shade of green. According to Bunsen, the true fusing point of sodium is $95°.6$ C., and that of potassium $62°.5$ C.; the latter does *not* pass through an intermediate pasty condition in fusing. The density of rubidium is about 1·52. It is considerably more electro-positive than potassium, takes fire upon water and burns with a flame which cannot be distinguished from that of potassium by the eye. Rubidium burns with brilliancy in chlorine and in vapor of bromine, iodine, sulphur, and arsenic.—*Am. Jour. Sci. and Arts, from Ann. der Chemie und Pharmacie*, cxxv. 367. W. G.

ON THE ELECTRO-CHEMICAL DECOMPOSITION OF INSOLUBLE SUBSTANCES.

By M. Becquerel.

Whilst seeking to oxidise silicium at the positive pole, in distilled water, with a pile of eighty elements of sulphate of copper, I found that this metalloid is not, as has hitherto been supposed, a non-conductor, but that it possesses, when traversed by an electric current, sufficient conductility to produce remarkable caloric effects, by reason of its great resisting powers. By putting small cylindroid crystals of silicium, prepared by M. Deville's process, into a porcelain, or better still a platinum capsule, in communication with one of the poles of the pile, and closing the circuit with a platinum wire, at least one millimetre in diameter, then by simply touching with this wire one only of the crystals, the adjacent crystals become incandescent. All the crystals follow the wire when it is raised, forming a small chain at reddish-white heat; at the same time a white smoke arises more or less visible, according to the force of the pile, and possessing an odor rather like that produced by breaking a piece of flint.

The intense heat is really produced by the resistance offered

to the electricity when travelling the silicium; for this result is obtained by using a pile of such force, that by touching the platinum capsule with a wire of the same metal only a feeble spark is emitted.

In experimenting with a nitric acid pile of twenty elements the heat is so intense that the platinum vessel is perforated, being melted where it comes in contact with the substance, as well as the end of the platinum wire, and, at the same time, a white smoke is disengaged, with formation of silica deposited as powder on the melted platinum, and also some silicide of this metal.

With charcoal electrodes complex effects are obtained, resulting from their combustion and the effects above described. The light is then too brilliant to be borne by the naked eye. In this and the preceding instance it is necessary to operate on a plate of rock crystal, the surface covered with silica; under the microscope this silica appears to be in a vitreous condition. —*Chem. News, London, May 9th*, 1863, *from Comptes Rendus, February*, 1863.

USE OF SULPHUROUS ACID IN THE MANUFACTURE OF SUGAR.

M. A. Reynoso* points out that the use of calcium bisulphite is prejudicial rather than advantageous. The excess of acid uniting with oxygen produces sulphuric acid, which reacts upon the sugar, converting it into grape sugar, and eventually into ulmic and formic acids, and ulmin, thus tending to produce color, instead of bleaching the saccharine liquid. Hence, he states that when the sulphite is used it should always be with an excess of lime. It is indispensable that the cane juice should be so alkaline as to turn litmus-paper blue. In the absence of litmus-paper, the alkalinity of the cane juice may be ascertained by its turbidity, and by the formation of a pellicle on the surface of a small portion when it is breathed upon.—*Chem. News, London, May* 30, 1862.

* Diario de la Marina and Comptes-Rendus, lvi. 46.

ON HYDRASTIA.

By F. Mahla, Ph.D., Chicago, Ill.

Hydrastia was detected by Durand, in Philadelphia, as early as 1851, who noticed its alkaline nature, but did not succeed in preparing it in a pure state.

It is contained in *Hydrastis canadensis*, in which it is associated with berberina. Mr. J. D. Perrins, of Worcester in England, first separated it from this plant in pure form, and described some of its properties, but did not institute an elementary analysis. At the time of Mr. Perrins' investigations, I had, prompted by the remarks of Prof. Procter, of Philadelphia, also prepared pure hydrastia, and intended to analyze it; seeing, however, that Mr. Perrins had promised to study its composition, I did not continue my investigations. After the lapse of more than a year, I do not any longer hesitate to finish my researches, and take the liberty to publish herewith the results.

Hydrastia may be obtained by adding aqua ammoniæ in slight excess to the liquid from which the berberina has been previously separated by an addition of chlorhydric acid. The precipitate, obtained under these circumstances, is collected on a calico filter, freed by expression from water, and mixed with strong alcohol, in which it easily dissolves by application of heat. On cooling, the hydrastia crystallizes readily, and may be purified from adhering coloring matter by redissolving and recrystallizing it several times with alcohol.

Hydrastia crystallizes in forms which belong to the right prismatic system. They are combinations of the longitudinal with the vertical prism, in which the planes of the first-mentioned form are prevailing. It is perfectly white, and its crystals exhibit great brilliancy. Hydrastia in the pure state is tasteless; its salts, however, have a bitter, heating, acrid taste. It melts like a resin, when heated to 135° C.; it decomposes at a higher temperature with emission of yellowish vapors, the odor of which resembles that of carbolic acid. When heated on platinum foil, it readily takes fire and burns with a smoky flame.

Hydrastia is insoluble in water; it dissolves, however, in al-

cohol and in ether. It is not affected by a dilute solution of caustic potassa, even if boiled with it for a prolonged period. Concentrated nitric acid does not at first act on it, but dissolves it afterwards with a red color.

Hydrastia dissolves in cold concentrated sulphuric acid, and imparts to it a yellowish tint; this mixture when slightly warmed, assumes a red color; bichromate of potassa produces with it a dark brown coloration, which is distinct, however, from the strychnia reaction, in as far as it does not show any blue or violet shades.

It dissolves readily in diluted hydrochloric acid; ammonia and caustic potassa produce in this solution white precipitates, which are insoluble in an excess of the reagent; ferrocyanide and iodide of potassium generate also white deposits; iodine dissolved in a solution of iodide of potassium produces a cinnamon brown precipitate, which, when heated with the liquid in which it is suspended, contracts readily to a resinous mass.

Bichloride of platinum precipitates the solution of muriate of hydrastia with a yellowish red, chromate of potassa with a yellow color. This latter precipitate dissolves when heated with the liquid, in which it is suspended, but separates again on cooling; before dissolving, it assumes, in the liquid, the appearance of a melted resin.

Terchloride of gold produces in the solution of muriate of hydrastia a reddish-yellow precipitate, which also contracts in the liquid on application of heat, and looks like melted resin; it, however, finally dissolves. Sesquichloride of iron produces no change.

In order to subject the hydrastia to an elementary analysis, it was desiccated at a temperature of 100° C., until it ceased to diminish in weight.

The analysis itself yielded the following results:

I. 0·5013 hydrastia, burned with oxyde of copper, gave
1·2260 carbonic acid, and
0·2712 water.

II. 0·5085 hydrastia, burned with oxyde of copper, gave
1·2377 carbonic acid, and
0 2608 water.

III. 0·4469 hydrastia, burned with soda-lime for nitrogen-determination, gave
0·2727 ammonio-chloride of platinum.

IV. 0·5904 hydrastia, burned with soda-lime, gave
0·3542 ammonio-chloride of platinum.

These results lead to the following percentage composition :

	I.	II.	III.	IV.
C =	66·696	66·379		
H =	6·010	5·698		
N =			8·822	8·767

In order to determine the formula of the alkaloid, I selected the platinum double salt, prepared by precipitating the hydrochlorate of hydrastia with chloride of platinum, and the hydrochlorate itself.

The chloroplatinate of hydrastia is an amorphous reddish-yellow powder, which is slightly soluble in water, better, however, in alcohol. When its alcoholic solution is boiled for some time, the platinum separates in the form of a black powder. The liquid, in which this deposit forms, has a remarkable blue fluorescence.

Chloroplatinate of hydrastia fuses, when heated to a little above 100° C.; it decomposes readily when heated higher.

1·0079 chloroplatinate of hydrastia, desiccated at 100° C., gave on careful ignition
0·1630 platinum.

This corresponds to 16·17 p. c. platinum.

The chlorhydrate of hydrastia is obtained by dissolving pure hydrastia in diluted chlorhydric acid. The solution obtained is evaporated over the water-bath to dryness. It then forms a gum-like white substance, which can be readily powdered. It is easily soluble in water and alcohol. Its aqueous solution has a strong blue fluorescence. It is uncrystallizable.

In order to determine the proportion of chlorhydric acid, which is in combination with the hydrastia, I dried the powdered salt for a long time at a temperature of 100° C., and then precipitated its aqueous solution with nitrate of silver :

0·7258 hydrochlorate of hydrastia gave
0·2419 chloride of silver.

This amount corresponds to 8·46 p. c. of chlorhydric acid.

From these results, I calculate $C_{44}H_{24}NO_{12}$ as the formula and

equivalent for hydrastia. Indeed, if we figure the percentage composition of a body with this formula, and compare it with the obtained data, we find that they agree well:

Hydrastia = $C_{44}H_{24}NO_{12}$ in 100 parts:

		Found.		Calculated.
Carbon,	=	66·696	66·379	66·333
Hydrogen,	=	6·010	5·700	6·030
Nitrogen,	=	3·832	3·767	3·517
Oxygen,	=	23·462	24·154	24·118

The chloroplatinate of hydrastia, $C_{44}H_{24}NO_{12},HCl+PtCl_2$, requires in 100 parts 16·32 p. c. platinum; I found 16·17 p. c.

The chlorhydrate of hydrastia = $C_{44}H_{24}NO_{12},HCl$, contains, according to its formula, 8·34 p. c. chlorhydric acid, while I found 8·46 p. c.—*Am. Jour. Sci. and Arts, July*, 1863.

ADDITIONAL OBSERVATIONS ON STORAX.

By Daniel Hanbury, F.L.S.

When I had the honor of laying before the Pharmaceutical Society some observations on Storax,* I hoped to be able to communicate at no distant interval such additional information as would complete the history of that drug. During the six years that have since elapsed, I have not lost sight of the subect, and although I am still unable to determine all the points I wished to clear up, I am induced by reasons which I will presently explain, again to bring it before the Society.

To render my remarks more intelligible, I will briefly recapitulate the conclusions which my former paper was intended to establish and which are the following:—

1. That the storax of ancient times was produced by *Styrax officinale* L.
2. That this substance has disappeared from the commerce of modern days.
3. That the resin called *Liquid Storax* is produced by *Liquidambar orientale* Mill., a tree indigenous to the south-west of Asia Minor, where the drug is collected.

These conclusions I had reason to believe were generally ac-

* Pharm. Journ. vol. xvi. p. 417.

cepted, until I received a few weeks ago a pamphlet by Professor Stamatios D. Krinos of Athens, which somewhat disputes their correctness. In vindicating my own opinions, however, I wish to draw attention to the new facts put forth in the learned essay of the Greek Professor of Pharmacology, and to couple with them some additional information on Storax of which I have become possessed.

Professor Krinos, whose pamphlet entitled Περί Στύρακος διατριβὴ φαρμακογραφικὴ (*A Pharmaceutical Essay on Storax*),* is in modern Greek,† commences by stating that he will endeavor to show:

1. That *Liquid Storax* was known to the ancient Greek physicians.
2. The reasons why he presumes that the text of Dioscorides requires a slight change.
3. That the *Solid Storax* of ancient authors was not the produce of *Styrax officinale* L., but of the tree called in modern Greek ζυγιά and by botanists *Liquidambar orientale*, namely, the same tree as that from the bark of which *Liquid Storax* is obtained by decoction and expression.

In support of the first proposition, Dr. Krinos gives an elaborate review of the ancient accounts of storax, from which, but especially from the statements of the later Greek writers he draws the conclusion that Liquid Storax was a drug with which they were acquainted. In the works of Paulus Ægineta, he observes, we first find mentioned besides solid storax, a second kind *liquid storax* and also the resin of the tree ζυγιά, which is the same thing as Liquid Storax. Aetius, who lived in the sixth century is cited as mentioning a *liquid storax* ; and also a spurious treatise of Galen, the writer of which referring to the resin of ζυγιά explains that it is synonymous with Liquid Storax. The Arab authors are then reviewed, and subsequently the pharmacologists of the last and present century. The learned author then points out that the word ζυγιά properly signifying *maple*, is now applied in the south-west of Asia Minor to *Liquidambar orientale*, a tree which *resembles* a maple or a

* Ἐν Ἀθήναις, 1862, 8vo. p. 27.

† I am indebted to the kindness of D. P. Scaramanga, Esq., for translating the pamphlet.

plane. He also states that about the year 1841, he proved that Liquid Storax was obtained from this tree, and that an account of this fact was published at the time in the *Melissa*, an Athens newspaper.

The second proposition of Professor Krinos is that the text of Dioscorides is incorrect. Dioscorides states that the storax-tree resembles the quince, which is certainly the case if *Styrax officinale* is intended, but by no means so if *Liquidambar orientale.** But Professor Krinos holds that the Storax (solid and liquid) of ancient authors is *not* the produce of *Styrax* at all: hence the difficulty of admitting the statement of Dioscorides, and the extraordinary proposal of *altering the text* so as to cause that author to say that the tree resembles not a *quince* but a *maple*. In reply to this I may remark that it would be needful to alter Pliny also, and that such a mode of disposing of the difficulty, unless supported by some obvious ambiguities in the early MSS. of these ancient authors, is surely inadmissible.

The third proposition that the solid storax of the ancients was derived from *Liquidambar* and not from *Styrax* is one from which I entirely dissent; still I am free to admit that a solid resin derived from the former tree *may* have passed as Storax in ancient times, though I am entirely unacquainted with such a substance. Professor Krinos assumes that as no resin produced by *Styrax officinale* now finds its way into commerce, it is impossible to believe that that tree ever yielded any. In this I do not concur: I have already shown that two respectable authors of the last century, Duhamel and the Abbé Mazéas actually collected storax from this tree, the one in Provence, the other in the neighborhood of Rome. I have also ascertained within the last few weeks from Dr. Kotschy of Vienna, that in the neighborhood of Alexandretta, the *Styrax*, which there grows to a tree, still yields its odorous resin. On the other hand I am bound to acknowledge that the endeavors I have hitherto used to obtain the resin from trees in the south of France, Asia Minor and Syria have not been successful. In Syria it is now rare to find the Stryax forming anything better than a large bush, owing to the practice of cutting it periodi-

* In modern Greek, the Storax tree is called Ἀγρία Κυδωνιά i. e. *Wild Quince.*

cally for fuel, and though I have myself examined many such bushes I have failed to find upon their stems any exudation. I believe however that where the Styrax attains the dimensions of a tree, better results will be obtained, and the correctness of the ancient accounts will be fully vindicated. Not only does the statement of Dioscorides that the Storax-tree *resembles a quince* indicate that he could not possibly have had the Liquidambar in view, but moreover the allusion made by him, and especially by Pliny to localities in Syria where Styrax-trees, but not Liquidambar, are still found, lend some weight to the argument. The geographical distribution of *Liquidambar orientale* is very restricted, in which respect it differs from *Styrax*. In the extreme south-west of Asia Minor it is gregarious, forming forests of trees of from 20 to 60 feet in height. Dr. Kotschy informs me that he has reason to believe it occurs at Narkislik, a village near Alexandretta and also on the Orontes. He also tells me that six fine old trees, *certainly planted*, exist at the convent of Antiphoniti on the north coast of Cyprus, but that there are no others in the vicinity: that the tree is there called ξύλον τοῦ Εφέντη (Governor's wood) and that it and the bark are used as incense in the churches. He adds that there are two trees of the same kind at the convent of Neophiti near Papho, but no others on the island. Professor Krinos states that the Liquidambar is common in Syria, a fact which is not borne out by the researches of botanists who have visited that country,* not one of whom has noticed its occurrence.

For these reasons I am not prepared to renounce the opinion that the storax-tree of Dioscorides and other ancient writers was the *Styrax officinale* of modern botanists, nor can I abandon the idea that, like its congener *S. benzoin*, it is capable of yielding an aromatic resin, which was once obtained in sufficient abundance to form an article of trade.

Before quitting the subject of Storax, I think it desirable to offer a few observations on some of the substances that are known in pharmacy under that name, and first we will take *Styrax calamita.*

* As Boissier, Gaillardot, Blanche, Roth, Bove, Michon, De Saulcy, Lynch, Erdel, Ehrenberg, Hooker, etc.

This drug as found in English commerce is so singularly variable that it would be difficult to suppose it a natural product. At Trieste where certainly some of it is manufactured, it is prepared (as I have ascertained on the spot) by mixing the residual liquidambar bark called *Cortex Thymiamatis*, reduced to coarse powder, with Liquid Storax. Such a mixture I have prepared myself and can assert that it constitutes excellent "*Styrax calamita.*" When first mixed (in the proportion of 3 to 2,) it forms a somewhat moist and clammy mass, which in the course of a few weeks developes an infinity of minute silky crystals, giving the whole an appearance of mouldiness. If the bark is scarce, common sawdust, I am informed, is substituted for it; and olibanum, red earth and honey are also employed in producing *Styrax calamita* of inferior quality. The drug is said to be manufactured also at Venice and Marseilles.

According to Professor Krinos, the Greek monks, particularly those of the island of Symi, prepare by mixing olibanum with Liquid Storax certain resinous cakes which they sell for incense under the name of ψωδομοσχολίβανον or στουράκι. It is a compound of this sort, that, in my opinion, constitutes the *Black Storax* described by Guibourt, Pereira and others, and not unfrequently found in continental drug warehouses. In fact I have more than once prepared such a mixture, which is remarkably fragrant and quite devoid of the coal-tar-like odor of Liquid Storax; an efflorescence of cinnamic acid generally developes itself on the surface of the mass. It is also this substance which appears to constitute the precious incense used at Easter in the Church of the Holy Sepulchre at Jerusalem, and of which small pieces are sold to the pilgrims at an enormous price,—not indeed for burning, but chiefly to be carried as a charm.

In conclusion I wish to express an earnest desire that any traveller visiting Asia Minor or Northern Syria, or resident in either of those countries would carefully examine the stems of *Styrax officinale* with a view to discover any adherent resin,—still more that he would perforate the trunk of that tree and observe after the lapse of some time whether such perforation is followed by an exudation of resin.

The President inquired of Mr. Hanbury the age and size to which the *Styrax officinale* now commonly attained. He was

induced to do so from having noticed that some substances yielded by plants could only be obtained from them when these had arrived at a great age. Thus the Ivy, when of a considerable age and size, produced a kind of gum, with a peculiar aromatic odor, but this gum was never observed on the Ivy under other conditions and circumstances, and was a rare product. He had found on some fine old Ivy-trees at Conway-castle, on one occasion, about half an ounce of the gum.

Mr. Hanbury stated that he had no doubt the absence of solid storax at the present time arose from the cause just alluded to by the President, namely, the rarity of old and large trees of *Styrax officinale;* for although the Styrax-tree was widely distributed, being found in Syria, the Levant, Southern France, and some of the other warmer parts of Europe, in very few spots was it to be found of any great size and age. In Syria this was easily accounted for, from the scarcity of wood generally, and all trees therefore which could be cut down by the rude tools which the inhabitants possessed, were used for fuel.

Professor Bentley said that the conclusions come to by Mr. Hanbury in his papers, were commonly so well substantiated, and arrived at only after so much consideration, that he should require very conclusive evidence to the contrary before he ventured to call his results in question. On the present occasion it did not appear to him that Professor Krinos had brought forward any satisfactory reasons in support of his statement that the text of Dioscorides was incorrect. Perhaps Mr. Hanbury, who had carefully read his pamphlet, could state what substantial reasons Professor Krinos had adduced. The ancients, Professor Bentley said, were good observers of natural objects, if not botanists, and it seemed to him quite clear that when Dioscorides stated that the storax-tree *resembled the Quince*, he did not mean that it *resembled the Maple.*

Mr. Hanbury could not find in Professor Krinos' pamphlet any reasons adduced for the alteration of the text of Dioscorides which would be at all satisfactory to a classical scholar. Professor Krinos appeared to have come to the conclusion that the tree yielding the solid storax of the ancients, was like the maple, and therefore the easiest way of overcoming the difficulty

of the text of Dioscorides was to alter it. Every author of importance had stated the storax tree to be like the quince, and consequently to oppose this view without good grounds seemed altogether unwarrantable.

Professor Bentley was glad to hear from Mr. Hanbury that *Styrax calamita* was really, so far as he knew, made up of liquidambar bark and liquid storax. It was consequently a genuine drug, in which the liquid storax and the bark, which had been separated from each other, were again united. *Styrax calamita* was, however, such a variable substance, that he (Professor Bentley) could not doubt that it was sometimes compounded in other ways. Professor Bentley remarked, that the only point necessary to prove to demonstration Mr. Hanbury's conclusions as to the origin of the solid storax of the ancients, was to find the storax *in situ*, on the *Styrax officinale*. It did seem to him somewhat remarkable, considering the wide distribution of this plant, that some trees should not exist of sufficient size and age to secrete solid storax. In Syria, as Mr. Hanbury had stated, the absence of trees of any great size was accounted for, but this did not satisfactorily explain the absence of such a secretion from other districts, where some large and old trees must surely exist. He had but little doubt, therefore, having full confidence in Mr. Hanbury's conclusions as to the origin of solid storax, that in course of time some would be found *in situ*. In order that the secretions should be formed, it was necessary, Professor Bentley said, that the plant should be found growing in a situation which was perfectly natural to it, that is, where every condition favorable to its development was present.—*Lond. Pharm. Journ.*, *April*, 1863.

ON A NATURAL FORMATION OF CARBONATE OF SODA.

By R. Haines, M. B., Professor of Materia Medica, Grant College, Bombay.

Some months ago a substance was brought to my notice by the Curator of the Economic Museum in this town, Dr. Birdwood, said to be a natural product of the neighborhood of Aden, and to be used only for mixing with and imparting pun-

gency to snuff. It consisted of irregular, nearly colorless, partly crystalline masses, composed apparently of two distinct portions: one, was a brilliant, confusedly crystalline mass, amongst which the angles of cubical crystals could be observed, the other, which seemed to be the upper portion, was a white amorphous substance, of a greasy feel, and rather strong soapy odor, very similar to that of crude borax. By taking portions of a number of lumps, and pounding the whole together, a fair average sample was procured.

Dissolved in water, a colorless solution was obtained, alkaline to test paper, and effervescing strongly with acids. Supersaturated with nitric acid, it yielded an abundant precipitate with nitrate of silver, a scanty precipitate with chloride of barium, and a slight crystalline precipitate, after some hours, with ammonia and phosphate of soda. A concentrated solution gave no precipitate with chloride of platinum and alcohol. The dry salt being rubbed with sulphuric acid, and then with alcohol, did not impart to the flame of the latter the slightest tint of green. From these experiments it appears that the salt consists of carbonate of soda and chloride of sodium, with traces of sulphuric acid and magnesia, but that it contains neither potash nor boracic acid.

8·668 grammes, dissolved in water, left an insoluble residue of fine sand, weighing ·377 grammes, equal to 4·35 per cent. The filtrate was made up to 100 cubic centimetres. Of this, 10 cubic centimetres required for neutralization of Mohr's normal acid 8·35 cubic centimetres, equivalent to ·1837 grammes of carbonic acid, and to ·44255 grammes of dry carbonate of soda. 50 cubic centimetres of the filtrate were therefore equivalent to ·9185 grammes of carbonic acid, and the whole 100 cubic centimetres to 4·4255 grammes of dry carbonate of soda, or 51·05 per cent.

50 cubic centimetres of the same filtrate, treated in a carbonic acid apparatus with sulphuric acid, lost ·915 grammes of carbonic acid. The carbonate is therefore a neutral salt. 4·963 grammes, gently ignited to incipient fusion, lost ·976 grammes, equal to 19·66 per cent.

From these data the following composition is deduced:—

Neutral carbonate of soda	51·05
Common salt, with traces of sulphate of soda and chloride of magnesium	24·94
Water and organic matter	19·66
Sand	4·35
	100·00

Subsequent information, obtained through the kindness of Captain Playfair, the Assistant Political Resident at Aden, was to the following effect:—"The substance is found all along the coast to the east of Aden, to an extent of perhaps ten miles, and its quantity is practically unlimited. It is usually found in hollows behind (or beyond) high-water mark, to which the sea-water has access by percolation. There is no demand for it at present, but some months ago sixty to seventy camel-loads a day were brought into Aden, and it met with a ready sale at 2½ rupees per ten maunds (equal to two shillings a hundred weight). The only use made of it is to mix with snuff, to increase the pungency; rarely, too, it is used for washing clothes. It is variously called by the Arabs *Dukduka*, *Hurka*, and *Kara*."

From the valuable paper published by Mr. H. J. Carter in the transactions of the Bombay Branch of the Royal Asiatic Society, on the Geology of Arabia, it appears that the whole of the south-east coast of Arabia, from Ras-ul-Had to Bab-ul-Mandib, is capped with nummulitic limestone, pierced at frequent intervals with basaltic effusions, and in many places elevated so as to form lofty and abrupt cliffs, in which, beneath the limestone, other formations are visible. As a result of this formation, the shingle on the coast consists mainly of limestone; and although no specific description of the coast immediately to the east of Aden has been given, there is no reason to doubt that the same peculiarities prevail there. It is then to the percolation of sea-water through a stratum of fragments of limestone that we must attribute the production of the carbonate of soda, by which percolation, probably, a partial interchange of elements has been effected between the chloride of sodium and the carbonate of lime, giving rise to the formation of chloride of calcium and carbonate of soda. It has been long

suspected that the natural production of carbonate of soda was dependent on the presence of carbonate of lime, and was brought about somewhat in this way; but what the conditions are under which the separation of the carbonate of soda from the chloride of calcium is effected, without allowing the former to exert its ordinary converse action upon the lime-salt and reproducing carbonate of lime, is a question that would form a very interesting subject of scientific inquiry. This is, I believe, the first time that the natural production of alkali from sea-water itself, without organic agency, has been observed.

It is hardly probable that the production of carbonate of soda in this way is limited to a few miles' distance from Aden. As the shore is so very similar along the whole 1125 miles which form the south-east coast of Arabia, there is a reasonable expectation of finding it at many places elsewhere; and an article so much in request, so easily procured, and with water-carriage close at hand, might yield a fair amount of profit to an enterprising shipper who should collect or purchase it upon the spot.—*Lond. Pharm. Journal, July*, 1863.

POROSITY OF PLATINUM TUBES.

MM. St. Claire Deville and Troost* have recently made some experiments, the results of which show that platinum vessels cannot be employed for experiments with gases or vapors at high temperatures.

By passing a uniform current of dry air through a platinum tube fitted within a porcelain tube, through which a uniform current of pure dry hydrogen was passed, and applying heat to the tubes, it was found that the air issuing from the platinum tube contained less and less oxygen as the temperature was increased, and that water condensed in the tube through which the air was discharged from the platinum tube. At about 1100° C. the gas consisted only of nitrogen and water vapor, and at the same time the hydrogen discharged from the outer porcelain tube was sensibly reduced in quantity.

The composition of the gas discharged from the platinum tube at gradually increasing temperatures above a red heat was—

* *Comptes-Rendus*, lvi. 977.

Oxygen . .	19	16·7	15.5	12·3	10·5	8.8	5·9	3·0	0
Nitrogen .	81	83·3	84·5	87·7	89·5	91·2	94·1	97·0	100

When the temperature exceeded 1100° C., the gas from the platinum tube also contained hydrogen from 1·2 to 21·9 per cent., according to the temperature.

The water collected contained some nitric acid.

By reducing the temperature, the gas discharged from the platinum tube was eventually pure air, as at the commencement of the experiment.

During the whole time, the hydrogen discharged from the outer tube was entirely absorbable by oxide of copper.

By rapidly closing the tube supplying the hydrogen to the outer tube, and immersing the discharge tube in mercury while the temperature of the tubes was high, the mercury rose to the height of 602 millimetres (the barometer being at 753), the small difference of 15 centimetres being due to the slight leak in the apparatus.

By passing a current of pure dry carbonic acid through the platinum tube, and a current of hydrogen through the outer tube, a large amount of carbonic oxide was produced, and discharged with carbonic acid and hydrogen in the following proportions, according to the temperature:

Hydrogen . .	12·7	7·3
Carbonic oxide .	—	17·7
Carbonic acid .	87·3	75·0
	100·0	100·0

When the current of hydrogen in the first experiment was replaced by a current of carbonic oxide, this gas did not penetrate to any extent into the plantinum tube.

These experiments were made with two tubes one millimetre thick (about 0·04 inch) and six inches long. They were heated to about one-fourth of their length. The tubes were manufactured in the ordinary manner for sulphuric acid retorts; they maintained a vacuum, and had been tested by high pressure.

All the above experiments were repeated by the tube made of melted platinum by Messrs. Johnston and Matthey about 0·08 inch thick and 24 inches long, but, notwithstanding this

greater thickness, the results obtained were exactly the same. —*Chem. News, London, June* 20, 1863.

ON SOME NEW PROPERTIES OF SULPHUR.

BY M. DIETZENBACHER.

A small quantity of iodine, bromine, or chlorine modifies in a remarkable manner the physical and chemical properties of sulphur. It becomes soft and malleable at the ordinary temperature, and maintains this form for a long time. This modification of sulphur, discovered by M. Charles Sainte-Claire Deville, and by him called *insoluble sulphur*, is almost entirely transformed by this process.

1. By heating a mixture of 400 parts of sulphur and one part of iodine, to about 180°, and then cooling it, a sulphur results remaining elastic for a considerable time. By pouring the sulphur on a glass or porcelain plate, flexible laminæ are obtained. This takes place with even a much smaller proportion of iodine.

Iodide of potassium acts in the same manner as iodine.

Treated in this way by iodine, sulphur becomes insoluble in sulphide of carbon. The liquid turns violet.

2. The action of bromine on sulphur is analogous to that of iodine; only instead of being black with a metallic lustre, the sulphur is of a wax-yellow color, and is much softer, and remains soft. This modification is produced with 1 per cent. of bromine, and about 200° of heat.

This sulphur is composed of from 75 to 80 per cent. of sulphur insoluble in sulphide of carbon.

3. By passing a current of chlorine on sulphur heated to about 240°, a soft kind of sulphur is obtained, easily drawn out, and the fragments of which readily adhere and unite.

With sulphide of carbon it behaves in the same way as sulphur treated by bromine. When freshly prepared, however, the sulphur, modified by the chlorine, yields about 10 per cent. more matter soluble in sulphide of carbon.

After being worked up for one or more hours, sulphur hardens suddenly, and becomes completely insoluble in sulphide of carbon.

These facts may throw light on some of the details of the manufacture of India-rubber vulcanised by sulphur and chloride of sulphur. Some of them confirm the results already obtained by M. Berthelot.—*Chem. News, Lond., March* 7, 1863, *from Comptes-Rendus.*

ON COMMERCIAL PERCHLORIDE OF PHOSPHORUS.

By M. Muller.

This compound has been for some time manufactured on the large scale, by saturating a solution of phosphorus in sulphide of carbon by dry chlorine. Some inconveniences attend this process, the worst being the liability of the product to become sulphurous,* and another, that it often contains free phosphorus, as is notably the case when the sulpho-carbonic solution is over concentrated, and cooled too suddenly at the beginning of the operation, before all the phosphorus has passed to the state of protochloride. In this case, a fawn-colored and waxy product is obtained, clearly distinguished from pure pentachloride, which is yellow and crystalline.

If, after the operation, sulphide of carbon, forming the mother waters, is simply decanted, when cold the crystalline crust can be preserved intact for some time ; but, after a certain time, it liquefies, and is reduced to protochloride of phosphorus. When much free phosphorus is present, this reduction can be effected suddenly, but then giving rise to dangerous projections.

To obviate these difficulties, M. Muller proposes, in place of the sulphide of carbon here serving as a vehicle, to substitute protochloride of phosphorus, which is also liquid. Phosphorus is then introduced, and the current of chlorine continued unto saturation. The operation can be repeated *ad infinitum ;* the author proposes to conduct it in special wide-mouthed bottles, closed with India-rubber caps adjusted by rings, the stoppers being pierced to admit the pipe for the escape of the disengaged chlorine.—*Chem. News, London, Jan.* 24, 1863, *from Zeitschrift fur Chem. und Pharm.*

* When cold, sulphide of carbon is only feebly attacked by chloride of phosphorus, and it is only in the end that the product becomes sulphurous, but, with heat, the reaction is very sensible.

AUSTRALIAN PRODUCTS IN THE INTERNATIONAL EXHIBITION OF 1862.

By Mr. A. Redford.

Perhaps the most striking object in the Australian portion of the International Exhibition, that ever-memorable record of the world's industry, was the pyramid of the commissioners, representing the quantity of gold exported from Victoria from 1851 to 1861.

This novel illustration of the amazing richness of the colony in the precious metal was well calculated to strike the attention of the public, and enable us to realize in some faintly practical manner the meaning of such sounds as I am about to utter, viz.:— weight, 26,162,432 troy ounces; 1,793,995 lbs. avoirdupois, or 800 tons, 17 cwt., 3 qrs., 7 lbs.; solid measurement, 1,492½ cubic feet; and value, £104,649,728 sterling. The height of the pyramid was nearly 45 feet, and measured 10 feet square at the base.

After treating of the "cost of production," and the proportion between "labor and luck," as shown in the statistics relating to gold mining in Australia, Mr. Redford gave a description of several remarkable nuggets which have been found from time to time, and also mentioned some other Australian minerals. He then proceeded to describe the vegetable products of Australia. As might be expected in a climate so favorable, the vegetable products are numerous and interesting. Forest trees abound of magnificent proportions, valuable alike for their timber, bark, gum, and leaves, from which we shall see abundant essential oils are obtained.

The forest trees consist of about 150 different species, of which upwards of 90 were represented in the Exhibition, and through the skill and great care of Dr. Muller, the Botanist Royal, the whole have been identified with strict botanical accuracy.

The Acacias, of which the wood of 14 kinds were shown, are very abundant in Australia. The pretty yellow plants sold at our flower-stalls must occur to the minds of many; they belong to the same class of Leguminous plants of the sub-order Mimoseæ. The Acacias form a leading feature in the botany of Australia, and are to be seen covering acres of ground, as the Yel-

low Wattles and others. They produce Gum Acacia and Gum Senegal in India and Africa; and one Tasmanian species—*Acacia sophora*—yields a food which is made into chocolate by the natives. Some few are poisonous. These trees are not generally large; the largest of them, I think, attains to 30 ft. in height, and 1 ft. in diameter. This is the Mayall, or *Acacia homatophylla.* The wood is very hard, and smells of violets; it is dark and beautiful, and much prized for turning, etc. Spearwood, or *Acacia doratoxylon*, as its vernacular name implies, is used for spears and other weapons by the natives; it is durable and hard. Blackwood, another of the Acacias, *Acacia melanoxylon*, is pronounced by the Jurors to be the most valuable of all our colonial timber. It is admirably adapted to every description of light and heavy framing, to cabinet and ornamental work, to shafts and wheels, and all kinds of turnery. It resembles the best walnut, and receives a very high and beautiful polish. The Wattle is the only other Acacia that need be mentioned, *Acacia mollissima.* This tree is almost universal in Australia, and is used by coopers for their staves, while the bark is extensively employed for tanning. The tanning of colonial leather is entirely carried on by means of their own barks, of which the Mimosa or Wattle bark is the most valuable. There was exported from Australia in 1858, 249 tons of bark, value £2,800; and in 1860, 654 tons 13 cwt., value £6,382—it is worth £4 per ton. Such improvements have been made of late in their tanneries and fellmongeries, of which there are a very large number, that colonial-made sole and harness leather is now preferred to the imported article. Four species of these trees furnish true gums, which exude from the trees as do the Acacia gums of commerce, and in some samples the masses are so cracked as to present a very white appearance. We must now turn to the trees of Australia *par excellence*, I mean the stately Eucalypti, or Gum-trees. These belong to the order Myrtaceæ, or Myrtleblooms, an order comprising within its limits a variety of size which is truly singular, so that we may almost say that in size it ranges, like Solomon's botany, from "the Hyssop which springeth out of the wall, to the Cedar of Lebanon." Prof. Lindley remarks—"There are all kinds of intermediate sizes from the common myrtle bush to the gigantic Eucalpyti of Australia;

some rise 200 feet in height with straight trunks, clear of branches for from 100 to 150 feet, and resembling an assemblage of elegant columns. These are crowned with branching tops of light willow-foliage; and some of the stringy-bark trees rise nearly as high as the Monument without branching."

Timber specimens of over twenty kinds of these trees were exhibited, and the resins, gums, oils, barks, and other products obtained from them are almost too numerous to mention. Some of the vernacular names are as follows:–Red gum, blue gum, white gum, iron bark, stringy bark, box, messmate, woolly-butt, black-butt, blackwood, manna gum, Swan River mahogany, &c.

The lecturer described several of these products and their uses, and then proceeded to speak of the essential oils yielded by gum-trees. Thirty-one kinds were exhibited, most of which were from the Eucalypti. The tree producing the greatest quantity is the Peppermint tree, so called on account of the supposed resemblance of the smell of the oil to the odor of peppermint. Two trees are so called, but one has the prefix of Dandenong, or narrow-leaved Peppermint-tree. Of all the samples exhibited the oil yielded by this tree, the *Eucalyptus amygdalina* appears, from its qualities as well as its abundance, to be the most important. They all appear to be fit for illuminating purposes in a very high degree, and for varnishes and perfumery; and they may, at least some of them, be useful in medicine. The oil of the Dandenong, or narrow-leaved Peppermint, is stated to be a thin transparent fluid of a pale yellow color, possessed of a pungent odor like that of oil of lemons, but coarser and stronger.

The properties of the oil were here described, and, with regard to its illuminating properties, Mr. Redford stated that it was not inflammable when brought in contact with flame until quite hot; but it burns with a white bright light in a kerosene lamp. Compared with the flame of American kerosene, it has not quite so much illuminating power, and the light is rather yellow in comparison. This observation does not apply, however, to specimens obtained from Ballarat, which, as well as nine other kinds from the gum-trees, and five from Melaleucas or tea trees, gave a superior light, and very white in comparison. A great number of substances—gums, resins, etc.—are very solu-

ble in this oil. Particulars were here given with regard to the solubility of various substances in the oil.

It does not appear that these oils are as yet commercially available. What has yet been done must be looked upon as principally tentative of their availability and nature. The process by which the oil is obtained seems most simple and inexpensive. Mr. Redford here made some remarks respecting the production of the oil at a sufficiently low cost, from which it appeared there was a chance of gum-leaves running short. He further stated that this objection has less weight in relation to another of these oils produced from the Mallee scrub, *Eucalyptus oleosa*. The extent of country covered by this scrub in Victoria is stated to be 5,560,000 acres, but the yield of oil is not so large as that of the Dandenong, being only 20 oz. from 100 lbs. (from the Dandenong 3 imperial pints per 100 lbs. of leaves are obtained). The Jurors looked upon this oil (the oil of *Eucalyptus oleosa*) as undoubtedly the first in importance, as the supply of the raw material could be maintained from day to day, as required for distillation, almost without limit.

Several other essential-oil specimens were also described. The Melaleucas, or tea-trees, were next mentioned, and descriptions given of the *M. squarrosa*, *M. linarifolia*, *M. Leucadendron* and some other trees of the same species. The Sassafras tree, *Atherosperma moschata*, of the Order *Atherospermaceæ*, is now considered a very important one as a valuable addition to the Materia Medica, as its bark contains an essential oil, obtainable by distillation, which acts with considerable power upon the vital functions. The manufacture of the oil of native sassafras is conducted with regularity and success, and the oil is sold for 15*s*. per ounce.

The physiological effects of this oil being the most important, I shall only refer to them. It appears to have come into general use in the hospitals, not only as being diaphoretic and diuretic like our sassafras, but as a sedative and having a specific lowering action upon the heart. In large quantities it is no doubt highly poisonous. The dose is one drop every 6 or 8 hours. Some further remarks were made concerning the properties of the bark of this *Atherosperma moschata*, and it appears that an infusion of it is sometimes used in the remote parts of the colony

as a substitute for tea. A new alkaloid, called Atherospermine, has also been obtained from it by M. Zeyer, of Munich.

Another plant likely to be of great value is the *Pittosporum undulatum*, the blossoms of which yield an essential oil of an extremely agreeable odor, resembling the perfume of the Jessamine flowers; and when we remember that no essential oil of true jessamine, as I believe, has been obtained in quantity beyond a mere curiosity, having a fancy value of about 6 guineas per ounce, if I remember rightly, then the usefulness of such a substitute will at once appear. The leaves of this plant also yield a very bitter extractive matter.

The Santalums were next mentioned; one of them is the *Santalum acuminatum*, which yields the native or Quandang peach, which makes excellent preserves. Another is the *Santalum persicarium*, or Sandel-wood.

Mr. Redford also remarked that it deserved recording that the gum-leaves had been applied to another and rather novel purpose. In October, 1837, Mr. G. W. Prangst, some of whose products we have now before us, obtained a patent in the colony "for obtaining by distillation, from the several varieties of gum-leaves,—first, a spirit-oleaginous compound, or crude oil; and secondly, carburetted hydrogen-gas, pyroligneous acid, and tar."

This patent gas was successfully manufactured at Kyneton,—a township some distance from Melbourne, which was lighted for two years with the gas. The quantity obtained from a ton of leaves was from 9,000 to 10,000 cubic feet,—a larger yield by far than that from wood, and of a greater illuminating power. But it seems that the patentee was obliged to resort to an admixture of cannel coal at the Kyneton Gasworks, to bring it up to the required standard, and ultimately, on account of the difficulty of procuring gum leaves, to use cannel alone.

I must now pass on to the resins. Of true resins there are two kinds: that from the trees called respectively Mountain Cypress Pine, or *Callitris cupressiformis*, and Desert Cypress Pine, or *Callitris verrucosa;* the other from the grass-tree, or *Xanthorrhœa Australis*. Both those resins were described, and with regard to the latter, Mr. Redford remarked that it seemed to have some resemblance to Gum Benzoin, and also to Dragon's Blood. It is very soluble in alcohol, and in Eucalyptic oils.

Ether takes up but little, and turpentine and the drying-oils take up very little. It was critically examined by a gentleman in Melbourne, who stated that it contains Cinnamic acid in addition to Benzoic acid, and that Picric acid was developed by the action of nitric acid upon it. The polishers of Australia use it instead of benzoin and I thought I would try its capabilities as a polish ingredient. I made so bold to use at the same time a small portion of the Australian sandric, so that my polish is composed of shellac, sandrac, Australian grass- tree gums, both kinds. The results pleased me very much; I never saw a finer polish, or one which came up so quickly.

A very interesting resin, of a fossil character, has been discovered at Brass River, in the Westport district, about 50 feet below the surface.

Immense quantities of gum-resins are frequently discovered in internal cavities of most of the gum trees.

I must not omit to speak of the Manna Gum, of which I had the honor to inform this Society previously. The Commissioners have favored us with a sample of this very interesting substance. The Eucalyptus which exudes this sweet concrete is the *Eucalyptus viminalis*, which Lindley calls *mannifera.* The taste is very sweet, and it contains a large quantity of grape-sugar, with about 5 per cent. of the substance called mannite. Its medicinal properties are almost *nil,* for while Lindley says it is less aperient than manna, my brother (who has resided a considerable time in Australia, and who has forwarded much valuable information) says you may eat a quarter of a pound of it without inconvenience, and the Jurors pronounce it of no medicinal value.

Much more that is interesting might be said on this subject, as for instance of the vine-growing and the wine samples, the fibres, arrowroots, ginger, honey of six years of age, silk, salt, and also of a dye made from a Coccus fed on gum-leaves; but having already exceeded a reasonable limit I will inflict no more, but trust that the want of originality in my paper will be atoned for by the interest of its details. The Australian products lately presented to the Association by the Commissioners for Victoria were exhibited, and Mr. Redford referred to many of them in his paper.

Mr. R. Evans said he had been informed by a medical gentleman that there was in the English market a gum, called the Coire gum, which was valueless in this country, but out of which the Americans were making a good thing. He had been offered it as low as 4*d*. a pound. It was all being purchased by the Americans, who dissolved it in the solvent oils from Australia, and made the varnish for photographers.

The Chairman said he had observed a peculiar odor about American photographic varnish, which reminded him very much of the Eucalyptic oils, but he had attributed it to oil of lavender.—*Proc. Liverpool Chem. Assoc. in Pharm. Jour. April.*

QUINIA FROM CINCHONAS GROWN IN INDIA.

Our readers will learn with much interest that quinia and cinchonia have already been extracted from the bark of cinchona trees cultivated in India. A short time since Mr. M'Ivor, the superintendent of the cinchona plantations in India, forwarded to this country a box containing specimens of cinchona bark of two years' growth, etc., from the Neilgherry Hills. These samples were transmitted to Mr. Howard for analysis, who obtained from them crystallizations of very white sulphate of quinine, as also some cinchonia, and sulphate of cinchonidia. This must be regarded as a most satisfactory result, and more especially so, as, according to Mr. Howard, the amount of alkaloids thus obtained appears to him to be quite as great as would be yielded by the bark of South American cinchonas of the same age.—*Lond. Pharm. Jour.*, *July*, 1863.

COCHINEAL IN ASIA MINOR.

To the Editor of the Pharmaceutical Journal.

Sir,—In the neighborhood of *Oushak*, in Asia Minor, there occur immense quantities of an insect, producing, when bruised, the usual cochineal color, and resembling in every respect the insects of the *Cactus cochinillifer* of Mexico, except that they are covered with a long downy sort of hair. When dry, the

hairs may easily be removed by gentle friction. These insects feed on a species of *Cistus*, the *Cistus laurifolius* of Boissier and Balansa, a small shrub with which the district abounds.

Perhaps some of your correspondents can inform us whether any of this cochineal comes into the English market, or has attracted the attention of naturalists.

Yours, &c., FRED. PERTWEE.

British Hospital, Smyrna, May 21, 1863.

Lond. Pharm. Jour., July, 1863.

ON BERBERINA—CONTRIBUTIONS TO ITS HISTORY AND REVISION OF ITS FORMULA.

By J. Dyson Perrins, F. C. S.

The objects of this paper are to announce some new sources for the alkaloid Berberina, to describe several of its salts hitherto unnoticed, and to review the formula proposed by Fleitmann.

The chemical history of berberina is somewhat remarkable, and it will not be out of place here to refer briefly to it. The first notice of this body has hitherto been attributed to Buchner and Herberger, who discovered it in *Berberis vulgaris*, in 1835. They erroneously regarded it as a weak acid, rather than as a powerful organic base, and Buchner's formula has long been abandoned. I find, however, that Chevallier and Pelletan deserve honorable mention as being the first observers of berberina; they accurately described it under the name of Zanthopicrite in 1826. More recently Fleitmann * published an account of "Berberina and some of its Salts," clearly establishing its basic character, and propounding a formula replacing that which had resulted from the previous labors of Buchner. Fleitmann's formula has obtained general acceptance,† varied,

* Chem. Gaz., 1847, vol. v. p. 129; Ann. Ch. Pharm., lix. 60.

† Except by Kemp, *vide* Chem. Gaz., v. 5, p. 209, who proposed a formula which has found no support; his platinum determinations agree with Fleitmann's and my own, but most unaccountably his carbon determinations of the platinum-salt are about two per cent. higher than those of any other chemist before or since.

however, by Gerhardt, who, on theoretical grounds, proposed the addition of a single equivalent each, of hydrogen and oxygen. In addition to many of the *Berberideæ*, various other sources for this alkaloid, so remarkable for its beautiful yellow color, have been discovered—by Boedeker * in *Cocculus palmatus*, the calumba root of pharmacy, belonging to the natural order *Menispermaceæ;* by Stenhouse † in *Cœlocline polycarpa*, natural order *Anonaceæ*, an African wood from Sierra Leone; by myself ‡ *Coscinium fenestratum*, natural order *Menispermaceæ*, a root from Ceylon; by myself ‖ also in *Xanthorriza apiifolia*, natural order *Ranunculaceæ*, a North American plant; by Mahla § in *Hydrastis canadensis*, another of the *Ranunculaceæ*, also a North American plant, common in the United States, the rhizome of which is used in American pharmacy.

Some time before the publication of Mahla's Paper, I had noticed the occurrence of berberina in *H. canadensis;* indeed it was through that observation that I was led to make the present inquiry.

I can recommend *H. canadensis*, which may be readily obtained in this country, as an excellent and available source for berberina; it yields about four per cent. of the crude alkaloid.

In addition to the sources already named, I have now to announce the following new ones; it seems unnecessary to describe the methods employed to isolate the alkaloid—they were always founded upon its solubility in alcohol and the sparing solubility of the nitrate in solution acidulated with nitric acid.

In the Indian Museum there is a yellow dye-wood from Upper Assam, called by the native name *Woodunpar;* of this I obtained a specimen through the courtesy of Dr. J. Forbes Watson; I find that berberina constitutes its yellow-coloring principle. I regret that I have been unable to ascertain the

* Chem. Gaz., vol. vi. p. 302.

† Pharm. Journ. Trans., 1855, vol. xiv. p. 455.

‡ Phil. Mag. [4] iv. 99.

‖ Pharm. Journ. Trans., 1862, vol. iii. p. 567.

§ Silliman's Journal, 1862, vol. xxxiii. p. 43.

proper botanical name; from its structure it properly belongs to the order *Menispermaceæ*.

A woody root called *Raiz de Sao Joao*, or St. John's root, from Rio Grande, I believe twice imported into this country, and of which a specimen has been kindly given to me by Daniel Hanbury, Esq., F. L. S., etc., abounds in berberina; in this instance also I am unable to give the botanical designation. I gladly avail myself of this opportunity of expressing my sense of the kind assistance I have received from my friend Mr. Hanbury in the course of this inquiry. Amongst numerous rare specimens this gentleman has favored me with, is a yellow bark from the Botanical Museum at Kew, of which little appears to be known; it is simply named "*Pachnelo* tree—*yellow dye—Bogota.*" This bark I find to be very rich in berberina, of which it yielded nearly seven per cent. of its weight. If further inquiry should show that pachnelo-trees are plentiful in New Granada or other districts in South America, a most valuable source for berberina will be secured.

The next source for this alkaloid which I have to announce is one of considerable interest; it is the root of *Coptis Teeta* or *Mahmira*, a Ranunculaceous plant of Hindostan and China, highly prized on account of its tonic properties, and known in the bazaars of India as *Mishmee bitter*. There is an historical notice of this root from the pen of the late Dr. Pereira.* He regards as probable that *Coptis Teeta* is a remedy of great antiquity—in fact, a classical medicine, used in ancient Greece, and described by certain Greek and Arabian authors; in more recent times known in Europe under another name, but its origin not suspected. The first accurate notice of the root by any modern writer was given by Dr. Wallich, from whose account I quote:—"Mishme Teeta is the name by which the drug is designated among the Mishmees and Lamas in the mountainous regions bordering upon Upper Assam. The Chinese call it *Honglane;* among these three nations it is in great estimation and universal use as a powerful tonic and stomachic. Quantities are sent down to Assam in neat little baskets, with open meshes made of narrow strips of rattan or some such material, and measuring three to four inches in length by two and a half in

*Pharm. Journ. Trans., 1851, vol. xi. p. 294.

breadth. Each basket contains about an ounce of small pieces of the root from one to three inches long; they are nearly cylindric, uneven, scabrous, more or less curved, of a greyish-brown color, and varying in thickness from the size of a crow-quill to double that diameter. The root is perfectly dry and brittle; occasionally a few fibrillæ are issuing from one end; the inside is hard, somewhat cellular, the outside of a dingy yellow color. The taste is intensely and purely bitter, very lasting, and with only a very slight aroma. On mastication, the root tinges the saliva yellow or gold-colored: it possesses no smell whatever."

This account well describes a quantity of the root which I received from the East India Museum, through the kindness of Dr. J. Forbes Watson. I soon ascertained that the active principle of *Coptis Teeta* is berberina, in which the root abounds. I obtained from it eight and a half per cent., which is the largest amount yet met with, nor will it probably ever be surpassed. I did not obtain any other crystalline substance from this root.

Lastly, I have succeeded in establishing the fact that Zanthopicrite, obtained from *Zanthoxylum Clava Herculis*, by Chevallier and Pelletan,* in 1820, is no other substance than berberina, and that consequently they must be considered as the first observers of this body.† My friend Mr. Hanbury again assisted my inquiry by furnishing me with some of the bark of

* Journ. de Chimie Med., 1826, vol. ii. 314: Note sur le *Zanthoxylum des Caraibes* ou *Clavalier des Antilles*, par MM. Chevallier et Gabriel Pelletan. This bark is used in the West Indies as a febrifuge.

† *Note by Professor Bentley.*—In a paper published in the March number of the 'Pharmaceutical Journal,' I stated that the peculiar crystallizable principle found by Dr. Staples in the bark of *Xanthoxylon fraxineum*, and termed by him *xanthoxyline*, had been commonly regarded as identical with the bitter crystalline principle *xanthopicrite*, discovered by Chevallier and Pelletan in the bark of another species of *Xanthoxylon;* and as Mr. Perrins had proved the identity of the latter principle with berberina, I was led to infer, naturally, that xanthoxyline and berberina were also identical. Mr. Perrins who is so well known for his researches on berberina, has since written to inform me that xanthoxyline and xanthopicrite are "totally distinct," and that xanthoxyline "has no resemblance whatever to berberina." Mr. Perrins also states that he could find no berberina in the bark of *Xanthoxylon fraxineum.*

Z. Clava-Herculis. According to Dr. Julius Martiny, a German pharmacologist of eminence, this bark is somewhat peculiar, from its highly laminated texture, splitting readily into thin plates like garden bast; this is noticed by the French authors, and altogether the careful description they give exactly applies to the bark which I have examined. The botanical synonyms are *Z. Clava-Herculis*, Linn.; *Z. Carolinianum*, Gaertner; and *Z. Caribæum*, Lamarck. It is quite necessary to particularize this, in order to prevent the confusion consequent upon the last-named botanist applying the specific term *Z. Clava-Herculis* to a tree which is totally distinct.

The French chemists do not appear to have attempted the ultimate analysis of their zanthopicrite, but they have carefully noted several of its properties and reactions, not omitting the somewhat unusual deportment of this body with sulphide of potassium. My own results have clearly proved the identity of zanthopicrite and berberina. *Z. Clava-Herculis* belongs to the natural order *Rutaceæ*, and furnishes the first recorded example of berberina being a product of any plant of that order.

I now proceed to detail the numerical results I have obtained. It seems unnecessary to state in each case from which plant I have prepared the salt for analysis; suffice it to say, that the whole of the sources now first announced are included.

It is not without some hesitation that I allow myself to question the conclusion of chemists of the eminence of Fleitmann, Boedeker, and others; but my own results are so accordant with each other, the number of analyses I have made, and the variety of combinations I have examined, are so considerable, that I feel not only justified in proposing an alteration of the formula, but indeed compelled to do so. Perhaps my hesitation is lessened by the recollection that, on a former occasion, I acquiesced in Fleitmann's formula, and even supposed that it was confirmed by my analysis of the hydrochlorate, and by a platinum determination; but later experience has shown me that the hydrochlorate is not suited for ultimate analysis, as by pretty long exposure to a temperature of 100° C., or thereabouts, it undergoes some decomposition, the color changes permanently, and much of it becomes readily soluble in cold water, yielding a red solution; in these respects it differs from

the undried salt, thus proving that some alteration by heat has taken place. The pure alkaloid itself is equally unsuited for analysis, and for similar reasons, indeed, I find it not easily prepared in a state of purity. With regard to the platinum determinations of some previous chemists, it is evident that impure products have been examined. I find that very many crystallizations are necessary before any of the salts of berberina can be pronounced pure. I must also state that the numerical results of Fleitmann agree with mine in many cases, and support the formula I propose rather than his own.

Fleitmann's formula is $C_{42}H_{18}NO_9$.* A glance at these numbers will suggest great doubts of their accuracy, the number of oxygen equivalents, and the sum of those of hydrogen and nitrogen, being indivisible by two; Gerhardt observed this, and proposed to represent berberina by $C_{42}H_{19}NO_{10}$? His alteration has the effect of increasing the atomic weight, which my results point out as being already too high. The formula I propose is $C_{40}H_{17}NO_8$, which, with Gerhardt's, is equally free from theoretical objection, and I hope to show that it is fully borne out by abundant analytical proof.

As the platinum salt possesses many advantages for determining the composition of the alkaloid, I have from time to time examined it. It may be prepared with ease in a pure state, in consequence of its great insolubility; like every other combination of berberina, it may be obtained in minute crystalline needles by precipitating a hot dilute solution of any berberina salt with bichloride of platinum. When collected, the precipitate should be washed with cold water until the washings, upon the addition of iodide of potassium, give no evidence of the presence of platinum; it may then be dried at once in the water-oven without any fear of decomposition, and it burns without difficulty.

The author gives the results of several analyses of chloroplatinate of berberina leading to the formula $C_{40}H_{17}NO_8HCl.PtCl_2$.

Chloroaurate of Berberina.

This combination was examined as possessing an advantage

*$C=6$, $O=8$; for the sake of comparison, these values will be retained through this paper.

even over the platinum-salt for the object in view, owing to the high combining weight of gold.

On adding terchloride of gold to the hydrochlorate or other salt of berberina, the double gold-salt immediately falls as an amorphous brown-colored precipitate, quite insoluble in water; it is purified for analysis by washing with water, and dissolving in boiling dilute spirit, from which it crystallizes on cooling in chestnut-brown needles, which may be dried at 100° C. without decomposition; it burns with difficulty.

Analysis gave results leading to the following formula:—
$C_{40}H_{17}NO_8.HCl.AuCl_3$.

The next combination to be described is interesting, as belonging to a class that I do not remember to have seen noticed before—viz., the double hyposulphites of silver and the alkaloids.

Hyposulphite of Berberina and Silver is precipitated in a yellow amorphous pulverulent form, when to a cold neutral solution of a salt of berberina is added hyposulphite of soda, saturated, or nearly so, with any silver-salt. The precipitant may be prepared by adding nitrate of silver to solution of hyposulphite of soda, so long as the precipitate first formed is redissolved; it must be filtered and used while fresh, as in time the silver is gradually deposited as sulphide.

The double berberina-salt is insoluble in water, but readily so in spirit, and in solution of hyposulphite of soda; it is decomposed by ebullition, with separation of sulphide of silver. To prepare the salt for analysis, I add the argentine solution to nitrate of berberina dissolved in weak spirit, while hot; the double salt crystallises out on cooling in minute prisms of a pure lemon-yellow color; they are readily washed with water, and the air-dried salt does not decompose or alter in color at 100° C. Upon careful and prolonged ignition, nothing is left but perfectly white metallic silver.

The analysis of this salt leads to the formula $C_{40}H_{17}NO_8$, $HO.S_2O_2,AgO.S_2O_2$.

Bichromate of Berberina.—This salt has been described by Fleitmann as an amorphous substance. I have to remark that it may be obtained in orange-yellow needles by adding bichromate of potassia to a boiling and very dilute solution of a salt

of berberina—the crystals separate entirely on cooling. This salt is extremely insoluble in excess of the precipitant and in cold water, but it may be recrystallized from a large quantity of hot water. It burns readily, and the green oxide of chromium may thus be determined with exactitude. This salt agrees in constitution with the bichromates of ammonia, lepidine, chinoline, etc., in containing only one atom of water.

The following formula is deduced from the analysis:— $C_{40}H_{17}NO_8HO,2CrO_3$.

The following salts were also submitted to analysis, and the formulæ given deduced therefrom:—

Nitrate of Berberina, $C_{40}H_{17}NO_8.HNO_6$.

Hydrobromate of Berberina, $C_{40}H_{17}NO_8.HBr.3aq$.

Hydriodate of Berberina, $C_{40}H_{17}NO_8.HI$.

I have now to describe a remarkable compound of iodine with berberina, having certain analogies with the quinine-salt termed herapathite. When dilute solution of iodine in iodide of potassium is added to solution of any salt of berberina in hot spirit, *carefully avoiding an excess of iodine*, the new substance speedily makes its appearance in the form of brilliant green spangles, which increase in quantity as the solution cools; they are invariably accompanied by crystals of hydriodate of berberina, or by the red salt last described, nor have I been able to devise any method of preparation by which this admixture can be wholly prevented. The formation of this new body is an excellent test for the presence of berberina; minute quantities may be detected by this reaction. Its occurrence seems to be determined whenever tincture of iodine containing hydriodic acid is added to solution of any salt of berberina in hot weak spirit, scrupulously avoiding excess of iodine; rapid agitation appears to promote its formation, and the presence of any impurity to interfere with it. Like herapathite, it bears a strong resemblance to particles of the elytra of cantharides, and to murexide; under the microscope it is seen to consist of crystals of a variety of forms, but I believe all derived from a rhombic prism; the larger crystals are wholly opaque; many of the smaller ones, however, are sufficiently thin to allow of the passage of light, which assumes a red-brown hue, sometimes inclining to violet; but the light is perfectly polarized;

in this respect also resembling herapathite, with which its optical properties are obviously similar.

I obtained this compound with the smallest admixture of hydriodate, and in the largest crystals, by heating in a strong bottle, solution of berberina in alcohol of 90 per cent., with addition of iodide of ethyl, to 100°C.; upon cooling, the bottle contains crystals of hydriodate of berberina, but if exposed to full sunshine for one or two hours, the crystals pass into the green salt now under notice. When the change appears to be complete, the bottle must be removed from the sunshine, or else the crystals will further pass into the red-iodine salt last described. Exposure to diffused daylight for some days may be substituted for sunshine; but, with every precaution, I have not been able to obtain the substance free from foreign crystals. It is not easy to see why this iodide of ethyl process succeeds better than others; probably the gradual development of free iodine is important. By this method I have obtained crystalline plates one-fifth of an inch in length, by about half that breadth—of course, perfectly opaque. When removed from the solution, and well washed with weak spirit, to remove adhering iodine, they have a blackish-green color with a fine metallic lustre, yielding a nearly black powder, which does not decompose at 100° C.

Berberina evidently occupies a position among the vegetal alkaloids of great interest in a scientific point of view—a position far more prominent than has hitherto been assigned to it; if noticed at all in our manuals, it is dismissed in half-a-dozen lines. From inquiries, which can be termed little more than superficial, its occurrence has been shown in numerous plants, belonging to no less than five of the great vegetal families,—the natural orders of the botanist,—nor can it be doubted that many other sources yet remain to be discovered; its geographical distribution, even in the present state of our knowledge, is all but universal; it is to be found in almost every country, certainly in every climate, and in these respects it claims precedence over all the other alkaloids.

As regards its usefulness to man, I believe its importance is not yet fully recognized. Though it has been long used as a fine yellow dye, more especially for animal tissues, its chief claims to

usefulness do not reside in its application to the economic arts—doubtless its therapeutic effects merit much careful investigation. Natural instinct has pointed out its value, for the alleviation of human sufferings, to nations widely separated and enjoying different degrees of civilization. The polished Greeks, the semi-barbarous nations of Hindostan and China, the North-American Indians, and the natives of tropical Africa, have been all impressed with the medicinal value of berberina. In the West India Islands and in American pharmacy its virtues have long been recognized, though derived from different plants, and veiled under erroneous names; certainly, it holds a place in European pharmacy but one of little prominence, yet it seems to possess properties scarcely inferior to quinine itself. Various medical writers have insisted upon its advantages as a remedial agent; their arguments it would be out of place here to recapitulate, but I am persuaded that nature has not placed berberina in nearly every country without some adequate purpose; there are evidences that its value is becoming better understood amongst ourselves, and I confidently anticipate that ere long its reputation will be greatly increased.—*Abridged from the Journal of the Chemical Society.*

ON THE SOLUBILITY OF SULPHATE OF LIME IN CHLOROHYDRIC ACID.

By S. W. Johnson, New Haven, U. S.

In this laboratory it has long been the custom to bring into solution for analytical purposes gypsum, so-called superphosphate of lime, and other substances containing much sulphate of lime, by treatment with hot dilute chlorhydric acid. The action is rapid, and the analysis may be carried on with more convenience than when decomposition is effected by carbonate of soda. The sulphate of lime is not taken up by very concentrated chlorhydric acid to nearly the same extent as when the acid is dilute, and therefore a saturated solution of the salt in the latter is copiously precipitated by the addition of fuming chlorohydric acid as well as that by water.—*Lond. Chem. News, May*, 1863.

Varieties.

On the Substitution of Soluble Glass for the Resinous Soap used in the Manufacture of Ordinary Soap. By Mr. Fr. Storer.—In many countries, but especially in America, enormous quantities of colophony have long been used in making hard brown or yellow soap. These compound soaps are very useful, and in point of cheapness no other soap can compete with resinous soap. The civil war in America, by causing the blockade of the slave States, whence most of the rosin is derived, has induced an extraordinary rise in the price of colophony, so that the further manufacture of cheap soaps seemed for the time arrested.

The attention of soap makers is then directed to the preparation of soaps containing silicate of soda.

The idea of employing soluble glass is by no means new. Its application to this purpose was long ago proposed and patented by M. Wilson, followed by MM. Sheridan, Gossage, and others. It seems to have been recently taken up anew in England. But the American process differs notably from those previously in use, by making use of a product rich in silica, capable of forming a hard and comparatively neutral soap, instead of the extremely alkaline mixture of the above-mentioned inventors.

This constitutes another example of the rapidity with which one industrial process displaces another, previously preferred, but whose further development is impeded by circumstances.

The American process commences in preparing by the dry way a silicate of soda containing five equivalents of silica and two of soda, which is dissolved by prolonged boiling in water. The solution is sometimes hastened by pressure.

The limpid solution, freed from all insoluble impurities, is decanted and concentrated to about 35° B., 1.32 specific gravity being the state in which it is sold.

After preparing by the usual process a certain quantity of pure soap with tallow, oil, or other kind of grease, and when the boiling is just finished, it is poured, while still hot and in a fluid state, into forms or moulds, and the desired quantity of concentrated solution of silicate of soda, either cold or heated, is added at the same instant. To incorporate the silicate thoroughly, the mass is stirred, until the cooling renders this operation difficult. It is then left to harden. By this process the silicate

of soda becomes so perfectly incorporated with the soap that as much as 60 per cent. of this solution at 35° B. may be added, and yet yield a soap of adequate consistency. But generally not more than from 25 to 40 per cent. of silicate is added to the soap.

It is this power of adding so large a proportion of alkaline silicate thoroughly saturated with silica which forms one of the great advantages of the American process. According to M. Steeber's experiments (Wagner, *Chim. Tech.*, p. 128), it is possible to mix only small quantities of the more alkaline silicates, such as were formerly used, with hard tallow or oil soaps, for when more is added the excess separates.

The experience of some American soapmakers who have recently tried to introduce 32 per cent. silicate of soda into their soaps, confirms M. Seeber's opinion.

Soap prepared by the American process differs materially from ordinary rosin soap neither in appearance nor action. It has passed satisfactorily through the trial of a great demand during the past year, and appears to serve perfectly well for all the uses to which ordinary soap is applied. The American Government has already bought large quantities of it for the use of the army at a much lower price than was formerly given for resinous soaps, and it has undergone all the tests exacted by the agents of the Federal Government.

We may remark that a mixture of silicate of soda and ordinary soap has been preferably used for some time in washing woollen fabrics in one of the largest establishments of the United States.

Silicate of soda is useful to soapmakers for several qualities not possessed by rosin; for instance, the addition of a large quantity of silicate of soda imparts to the soap neither that disagreeable odor nor the glueiness which too great a proportion of rosin communicates. It may be introduced into soap in much larger proportions than rosin without in any way injuring the sale of the product.

It is not probable that rosin will ever resume its former importance to the soapmaker. It will still be used conjointly with the silicate of soda, since a little rosin serves to correct the nauseating odors of inferior fats, and because, according to some makers, it augments the detersive action of the soap.

The use of soluble glass in hard soaps should not be confounded with the use as detergents of simple solutions of silicate of soda, as described by M. Kopp in the *Répertoire*, vol. i., p. 193. The latter are simply alkaline solutions, similar to those of alkaline carbonates. They act chiefly, if not wholly, by their chemical nature, for they do not lather, and in that and other respects are unlike real soaps; while the silicate of soda soap, owing to the portion of fatty acid it contains, lathers abundantly, and behaves like ordinary soap, the mechanical and chemical conditions required by a good soap being fulfilled.

It should be borne in mind that silicate of soda soap is distinct from siliciferous soaps formerly prepared by the mechanical addition of silica or of some insoluble silicate, such as silicate of alumina, which is simply a useless adulteration, while in soaps containing soluble glass a portion of fatty acid, so to speak, is replaced by a weak mineral acid, equally efficacious in modifying the causticity of the alkali.

These silicate soaps must not be confounded with the "Marseilles soap," which, when genuine, is still the soap *par excellence.* I am far from thinking that the silicate of soda produces soap equal to that made strictly from fatty bodies.—*Chemical News, London, July* 11, 1863.

Pressure at the Bottom of the Atlantic.—Several experiments have been tried during the last few days, at the Wharf-road, to determine what effect the pressure of the Atlantic sea has upon a submarine cable laying on its bottom at a depth of 2¼ miles. The experiments were made in Reid's large press, capable of resisting a pressure of above 10,000 lbs. on the square inch. The specimen of cable used is known as the Persian Gulf standard, having a coating of gutta-percha ⅜ of an inch in diameter. It was subjected to a pressure equal to two miles and one quarter of a mile deep, and the pressure kept on for one hour, first having been carefully tested by what is known as Professor Thompson's reflecting galvanometer.

Some people who call themselves electricians were of opinion that this enormous pressure—about 5,000 lbs. on the square inch—would force the water into the copper core, and by this means deteriorate the cable, if not quite destroy it.

These experiments have completely demolished this theory. On the contrary, when the pressure was removed, the cable was found to be considerably improved, and gave with the same instrument several degrees of improvement. These experiments will be continued during the course of next week, upon a more extended scale, and carefully recorded.

At the present time several gentlemen wished to ascertain the truth of an old anecdote current at sea, that was said to be performed by an old salt, viz: he sunk a bottle of wine to a great depth in the Atlantic, securely corked, and when pulled up all the wine had disappeared and was replaced by salt water. Another story of the same kind has been long in circulation—that if you take an empty bottle, securely corked, and sink it to a great depth, it will come up filled with salt water, while the cork remains undisturbed.

In order to test the first of these theories, six quart bottles of Bass' pale ale were submerged, securely corked and wired down, then covered with Betts' patent capsules; there were also several bottles of lemonade and ginger-beer, all properly secured in the same way.

To test the second theory of the empty bottle, one was securely

corked and wired, one was corked after another fashion, having a large knob left on the cork in the form of a champagne cork, to prevent it being driven in. The third bottle had a wood cylinder put inside, resting on the bottom, and reaching the cork, to give another form of resistance to the cork. The pressure was the same as before, and the time under pressure the same, viz., one hour.

The results were as follows:—The Bass's ale came out all sound and good, the same with the lemonade and ginger-beer. The small space left by the bottler between the cork and the liquor was filled up. With this exception all was the same. The first empty bottle the cork was driven in, and as a matter of course the bottle came up filled with water. The second bottle with the large knob was also driven in, and the bottle came up full. The third, that had the wooden cylinder inside, on which the cork rested, was driven in to a certain extent, not whole, and this bottle came up also full, showing that at these great depths no corking, however secure, will prevent the water from getting into an empty bottle, and when you send the bottle down filled and well corked, there is no danger of the liquor making its escape and being filled with another; so that the sailor must have drank the wine first, and sent the empty bottle down afterwards.

Another interesting experiment was tried to test the accuracy of Dr. Wallich's statements as regards living creatures at great depths in the ocean.

It is a generally received opinion that no living creature exists at the bottom of the Atlantic—that in these dark and silent regions of the great deep eternal silence and solitude reign, the bottom being a fine deposit of diatomates too minute for the naked eye of man.

To demonstrate this, some live carp, lobsters, eels, &c., were put in the cylinder; the same pressure (Atlantic depth) and the same time—one hour. The whole perished, and came out quite stiff, thus proving that the general opinion on this subject is correct, and that Dr. Wallich's statement wants confirmation.—*Chemical News, London, July 25, 1863, from Engineer.*

Recovery of Gold from Cyanide Solutions. By R. Huber.—The author gives the following as a quick and cheap process for reducing gold from inactive gilding solutions:—

The liquid is first supersaturated with hydrochloric acid, and heated to boiling, on which a yellowish-green precipitate separates with the development of cyanic and carbonic acids. Some of the cyanide of gold remains in solution, the greater part of which, however, will separate on cooling. After separation from the deposit by filtration, the solution is heated again, some zinc, and, if necessary, more hydrochloric acid being added. In an hour or two the whole of the gold will be found reduced. The liquor is now poured off, and the precipitate boiled once more with

hydrochloric acid. It is then washed and added to the other precipitates. The mixed precipitates, after drying, are ignited in a platinum crucible and then fused with an equal weight of acid sulphate of potash. When cold, the fused mass is boiled with strong sulphuric acid, the liquor is poured away, and the now perfectly pure gold is well washed with hot water. A cast iron crucible may be used for the fusion instead of a platinum, but in that case the gold must be boiled with strong hydrochloric acid to remove the iron.—*Chem. News, London, July* 18, 1863, *from Dingler's Polytech. Journal.*

Strength of the Fibres of Orleans Cotton.—Mr. Charles O'Neill exhibited a mounted fibre of Orleans cotton, torn by a gradually increasing weight suspended to its extremity. It had sustained a weight (gradually increased) of 162 grains for many minutes. Mr. O'Neill stated that there were 143 such fibres in ·01 grain of cotton, each fibre therefore weighing less than the ten-thousandth part of a grain. The strongest fibres were capable of supporting more than two million times their own weight. He is engaged in making experiments upon the tensile strengths of various fibres by a special apparatus, but they are not yet completed.—*Jour. Fr. Inst., from Proc. Manch. Lit. and Phil. Soc., March* 16, 1863.

Saracenia purpurea in Smallpox.—Doctors differ more than ever as to the value of the reputed remedy for smallpox which was so fully described in our January number. Surgeon-Major Cosmo G. Logie, of the Horse Guards, states that he has given *Saracenia purpurea* successfully in eleven cases of the disease, the patients having rapidly recovered under its peculiar influence. "This remedy," he writes, "I consider a boon to the public, for this reason—it is so easily managed; any one can make a decoction or infusion of the root, like tea. An ounce of the root is sliced and infused in a quart of water and allowed to simmer down to a pint, and given in two-tablespoonful doses every few hours, while the patient is well nourished with beef-tea and arrowroot. Four of the cases in my hospital have been severe confluent cases; they have throughout the disease all been perfectly sensible, have had excellent appetites, been free from pain, and have never felt weak. The effects of this medicine, which I have carefully watched, seemed to arrest the development of pustules, killing, as it were, the virus from within, thereby changing the character of the disease, and doing away with the cause of pitting (if I may so express myself to the uninitiated), and thus avoiding the necessity of gutta-percha and india-rubber applications, or of opening the pustules. In my opinion, all anticipation of disfigurement from pitting may now be calmed, if this medicine is given from the commencement of the disease. Before leaving this subject, I may here caution the public that the useful part of the plant is its root, as recommended by Dr. Miles, and it can only be

obtained from Messrs. Savory and Moore, to whose house alone it has been imported."

Dr. Dudfield, of Kensington, believes that Mr. Logie has given the drug credit for effects which really proceed from vaccination. Referring to the passage we have quoted above, this physician writes—

"This description, so far as it goes, agrees with the course of many cases of smallpox occurring in vaccinated persons (modified smallpox), in whom there is generally no 'pitting.' I am therefore tempted to inquire whether the subjects of these eleven cases had ever been vaccinated? I have myself little doubt they had, and I incline to the belief that the modification of the disease was due rather to that circumstance than to any influence possessed by the *Saracenia purpurea*, a 'remedy' which has been largely used by some other practitioners, and by them stated to possess no 'peculiar' or any other influence over the progress of smallpox."—*Chemist and Druggist, July* 15, 1863.

Acetic Acid and its Homologs in Wine.—M. Bechamp* has observed that even new wine which has been fermented out of contact with the atmosphere, always yielded an acid liquid on distillation. He obtained from wine about 0.4 per cent. of soda acetate, and by fermenting sugar in an atmosphere of carbonic acid he obtained a mixture of acetate and salts of fatty acids in small amount, the solution of which gelatinized when evaporated to the point of crystallization, and after a time yielded crystals of soda acetate, amounting to about 35 per cent. of the sugar fermented.

M. Bechamp considers that the acetic acid is not merely the result of the oxidation of alcohol, but that it, and the homologous acids accompanying it, are produced by fermentation. In support of this view, he refers to Lavoisier's observation,† that the product of the fermentation of sugar contained acetic acid.

M. Pasteur,‡ commenting on this opinion, points out the probability that the acids which have long been known to exist in fermented liquors are the result of alteration of the ferment, and do not originate from sugar. For this reason he has not included them among the products of alcoholic fermentation. The presence of acetic acid observed in fermented liquids, he considers to be merely accidental, and due either to the special conditions which are determined by the growth of a mycoderm, or to the action of a specific ferment, different from the alcoholic ferment.

Though, under ordinary circumstances, acetic acid and its homologs are always recognisable in alcoholic liquids, this is not the case with liquids fermented with alcoholic ferment, which do not give any indication of the

* Comptes-Rendus, lvi., 969; † Traite de Chemie, i., 147; ‡ Comptes-Rendus, lvi., 989.

presence of those acids, however carefully they may be evaporated, either by the smell or by reaction upon test-paper.

As to the source of these acids, M. Pasteur is still undecided, and he regards the determination of this point as one of the desiderata of his researches on the subject of fermentation.—*London Chem. News, June* 20, 1863.

New Silk Moth.—The introduction of a new Silk Moth (*Bombyx Cynthia*) into Europe bids fair to be of great importance. It was first sent from China to Turin by a Piedmontese missionary in 1857, and so early as 1858 it had attracted the attention of Guèrin-Meneville at Paris, so far as to induce him to plant 5000 trees of *Ailanthus glandulosa*, on the leaves of which the caterpillar feeds. It is reported that the almost incredible quantity of 100 millions of trees are now planted in France for the sustenance of the caterpillar, insomuch that Guérin-Meneville has said that "Henry IV. gave us silk for the rich, but Napoleon III. has given silk to the poor.

We believe, indeed, with every reader of 'Quentin Durward,'* that silk was produced in France long before the reign of Henry IV.; but however this may be, the produce of *Bombyx Cynthia* is of a far coarser and more durable nature than ordinary silk. In China it forms the greater part of the material of which the clothing of the middle-class is made, and is so durable that a garment descends from parent to child, besides having the valuable qualities of never contracting grease spots, and being waterproof.

So useful an article of commerce, the culture of which had already extended from Italy to France, Switzerland, and Belguim, could scarcely help attracting the attention of Austria, where there is such a variety of soil and climate, suited in some locality or other for almost everything which can be employed to any useful purpose in art or manufacture, provided it does not require tropical heat. Experiments were accordingly made at Trieste and Görtz in raising the new silkworm, and apparently with some success. It was, however, desirable to ascertain whether there was any promise for more northern latitudes. Accordingly a manufacturer of the name of Fichtner, at Atzgersdorf, at a short distance from Vienna, on the borders of the river March, a tributary of the Danube from the north, has taken the matter in hand, and has laid before the Trade Union of Lower Austria, on the 17th of October, 1862, an account of his experiments, of which we now have an abstract before us.

One great advantage attending the culture consists in the fact that unlike the common silkworm, the *Ailanthus* caterpillar requires scarcely any care, if a single harvest only is desired. If, however, two or more are sought

*Louis XI. is there spoken of as the great silk-merchant and cultivator of Mulberry-trees, under the name of Maitre Pierre.

for, the eggs must be hatched artificially, and the caterpillars fed on the leaves of *Dipsacus fullonum*, or artificially forced *Ailanthus*, till the leaves are expanded in the open air. At present great difficulty has been experienced in running off the silk from the cocoon, and in consequence the process of carding must be employed, which is wasteful, besides yielding a kind of silk resembling wool rather than common silk. But even here there is one advantage, viz. that the cocoon is far less injured when the moth makes its appearance than in that of the old silkworm.

All that is necessary where a single crop only is desired, which is conceived to be the most useful plan for Austria, especially for small proprietors, the persons who are expected most to profit by the scheme, is to cover the hedge of *Ailanthus*, the most convenient form in which the plants can be grown, with a common net spread over hoops, to protect the caterpillars from the house sparrow, which is peculiarly fond of them,—a curious matter, as they are so very different from any caterpillar to which sparrows are used.*

The insect assumes the pupa state in from thirty-eight to forty days after the caterpillars first make their appearance, and in about twenty days more the moths appear. The pupæ must be placed in some convenient box lined with cotton and covered with net work for protection, in order that the eggs may not be lost, and may be conveniently removed by cutting to pieces the lining or net to which they are attached. Unfortunately the eggs retain their vitality only for a short time, and dependence therefore for the next year's crop must be placed on those pupæ which do not at once change to the imago.

Experiments have been tried in the north-eastern corner of Moravia, at the northern foot of the Carpathian Mountains, which have been equally crowned with success, a circumstance which makes it not impossible that the insects may succeed in those parts of Great Britian where the *Ailanthus* will flourish. Success indeed is more probable, as the caterpillars are not impatient of moderate changes of temperature, though as autumn advances, when the nights are cold, they will begin to spin the cocoons, but will not finish them, as they die before they can attain the state of pupæ. There is the more reason to hope that they may succeed in England, as the degree of labor which they require is so small as not to make it a serious item of expense.

At present, the experience is of so short a date in Germany that it is quite premature to speak of the relative expense of production and profit. Herr Fichtner, however, is sanguine that without detracting much from other objects of cultivation, the small proprietor will find his end answered in having on his few acres a hedge or two of *Ailanthus*, which will produce

*The caterpillars are at first black with yellow spots, then yellow with black spots, then white with black spots, then emerald-green with indigo spots, when they are very fat and greedily sought by the birds.

about a pound of silk for every twelve feet, the only expense being the wear and tear of the protecting net, as the small amount of labor can easily be supplied by the cottager's family.—*Lond. Phar. Journ., Aug.* 1863, *from M. J. B., in the Gardeners' Chronicle.*

The Upas Poison.—A dangerous experiment.—The upas tree of Java, known to botanists as the *Upas antiar* or *Antiaris toxicaria*, produces a milky juice with which weapons are poisoned. The poisonous principle is called *antiarin*, and contains $C_{14} H_{10} O_5$. It forms small pearly crystals soluble in 27 parts of boiling water, and also in alcohol, but scarcely so in ether. Introduced in a wound, it rapidly brings on vomiting, convulsions, and death. The *Abeille Médicale* states that a short time ago a scientific gentleman at Berlin received a small quantity of the condensed juice of the upas, and resolved to try the effects of it upon himself. One afternoon he accordingly took three grains of this drug, which he found very bitter and rather saltish. Immediately afterwards he felt extremely gay, and a bad headache which he had at the time disappeared; but after a while he experienced a sensation of oppression in the stomach. Nevertheless, he had the imprudence to go out: on turning a corner he became aware of a considerable stiffness along the spine; this was about half an hour after having taken the poison. An hour later, while taking a cup of coffee, he felt a violent shock throughout his body and stiffness at the extremities; at the same time his head was thrown backwards, he lost all power of speech, but his mental faculties remained unimpaired. There was a slight remission of these symptoms for a few minutes, and then a fresh attack came on; and this continued until the patient at length succeeded in expressing a wish to be taken to the hospital of La Charité. As he was being helped downstairs to get into a carriage, a new attack impeded his progress; but during the drive he had none, although the slightest shake seemed sufficient to bring it on. These attacks were attended with but little pain; deglutition was very difficult, and the patient felt very weak. After every attack the muscular system relapsed into inertness. At the hospital, emetics were immediately administered to expel the poison if any remained; the vomiting was attended with sudden starts, spasms in the glottis, and difficulty of breathing; the latter symptom, however, soon subsided. The pulse was at 72. Thirty drops of laudanum were administered at the rate of ten for every quarter of an hour, and then thirty more, in three parts, at intervals of half an hour. The patient fell asleep, but was often awakened by the contraction of the muscles of the back and neck. Laudanum was again administered, and sleep returned. On the following morning the patient felt very weak, but only complained of stiffness in the left muscles of the neck; the pulse was at 66. Wine and light food were now given instead of medicine, and on the sixth day the patient left the hospital perfectly recovered.—*Chemist and Druggist, May* 15, 1863.

Adulteration of Quinine.—Mr. J. Brendon Curgenven, in a letter to the 'Dublin Medical Press,' May 13th, states that *muriate of cinchonine* is extensively used to adulterate the disulphate of quinine, and he advises all who have quinine in their possession to ascertain by the following tests how far it is adulterated:—"Quinine is soluble in ether, but cinchonine is not; quinine mixed with water, is dissolved by adding a little chlorine water; if to this solution ammonia be added, it becomes grass-green in colour. If cinchonine be treated in the same way, the ammonia produces a white precipitate."—*London Pharmaceutical Journal, June,* 1863.

Death from Swallowing Blue Pills.—An inquest has lately been held at Rogate on a woman named Caroline Stevens, who died from mercurial poisoning brought on by taking blue pills. It appeared from the evidence that she had once been ordered by a medical man to take a quarter of an ounce of blue pill in a month. She derived benefit from the prescription, and the next year she procured more in larger quantities, which she took till it affected her mouth. The following two years she obtained still larger quantities, and on both occasions it produced more or less salivation. She usually procured it in lumps of a chemist living at Petersfield. She thought the last time she left it off too soon. On the present occasion she procured more, and had been taking it six weeks. Dr. Peskett, who attended her, found, by directions of the deceased, in an old wardrobe, done up in a quack medicine paper, ten rolls of pills, which he produced. Each roll was $1\frac{1}{4}$ inch in length, and $1\frac{1}{8}$ inch in circumference. Deceased told him that she usually took fifteen pills twice a-day; on one occasion she took fifteen three times in one day; for several weeks not less than twice a-day. The druggist who sold her the blue pills said she had been in the habit of buying three or four ounces at a time. He sold it under the impression that she and her husband had bought the pills for the purpose of retailing them in the country.—*Ibid. from Medical Times and Gazette.*

Digestion.—Mr. Brücke, of Vienna, (*Constatt's J. de Pharmacie*) has communicated to the Austrian Academy of Science an interesting paper on the influence of acids and pepsin in digestion, and on the question whether the latter is formed during that process; and also, in what manner the secretion of the digestive fluid takes place. By pepsin, Brücke understands the nondescript substance emanating from the glands of the stomach, and which, in an acid solution, has the power of dissolving all albuminous matter in the stomach as well as without it. He found by a number of careful experiments that this power is strongest in a solution of $\frac{7}{8}$th gramme of dry hydrochloric acid in a litre of water, decreasing when the amount of acid rose above $1\frac{1}{2}$ or fell below 9-20ths of a gramme. Contrary to the generally accepted views of Mulder, that part of the albuminous matter may pass into pepsin, Brücke's experiments go to show that such is not the

case. He concludes that the stomach in an empty condition contains no acid fluid which is only secreted by the action of the nervous system when food is introduced. Dr. Ebstein (*ibid.*) communicates a series of experiments on the action of saliva upon starch. Like Leuchs, Frerichs, and others, he found that starch, in contact with saliva, even in the presence of some acid, to a certain extent is converted into dextrin and sugar, and that the secretions of the stomach, though of an acid reaction, do not prevent this change. Dr. E. remarks, that while secreting the saliva necessary for his experiments, he found it advisable to abstain from smoking, which, we suppose, he otherwise considers a legitimate occupation during physiological experiments; he does not, however, suggest the same caution in regard to chewing.—*Chem. News, London, July* 11, 1863.

Editorial Department.

The Pharmacopœia of 1860.—Many of our readers have ere this time had an opportunity of examining this long expected work, and are beginning to learn somewhat of its contents. It had been our intention to have prepared an extended notice of the Pharmacopœia for this number, but finding we could avail ourselves of the able pen of our friend Alfred B. Taylor, Secretary of the Committee of Revision, we feel relieved from making much comment at this time, reserving for future occasions a series of notices of some of the formulæ. We invite our readers to carefully examine the paper of Mr. Taylor at page 401 of this number, in which they will find a condensed view of the changes and additions which have been effected by the Committee of Revision. As a preliminary preparation to aid in thoroughly understanding the new Pharmacopœia, we earnestly suggest that apothecaries should first study carefully the preliminary notices from page 1 to page 7 of the text on weights, measures, temperature, percolation and the fineness of powders. Mr. Taylor's comments explain the importance of this, but we feel constrained to give additional testimony to the same end. The process of percolation has been so thoroughly adopted, and the value of that process depends so much on the proper fineness of the powders treated, that the reader will at once understand us when we say that these preliminary notices are the foundation upon which the Pharmacopœia is erected. As regards the use of sifted powders for percolation, a new era will have to be commenced by those Apothecaries and Druggists who have been careless in regard to the state of division of the powders used in this process, if they expect to produce the preparations intended. Because in many instances the first strong liquor is reserved and the strength of the first runnings in a process of percolation is due in great measure to the proper division of the powder.

In fact every practical pharmaceutist should be so familiar with the actual value of the terms "coarse," "moderately coarse," "moderately fine," "fine" and "very fine," as relates to powders, as to recognize them at once when used in a formulæ, as having positive and not general meanings.

It also occurs to us to suggest a careful reading of the Materia Medica lists, so as to get familiar with the new officinal names, with the meaning of such as are not known, with the strength of acid solutions, etc. It is greatly to be desired that physicians will make themselves acquainted with the changes and additions of the Pharmacopœia, and assist in the endeavor to make it the rule and guide that it should be to themselves as well as to the apothecaries. Especially at first let them become familiar with the changes of strength in preparations, as in Fluid Extract of Valerian and of Buchu which are double the old strength and require but half the dose.—Again ,*Liquor* Potassæ Citratis, now means a Solution of Citrate of Potassa, made extemporaneously from specified quantities of Citric Acid and Bicarbonate of Potassa without any oil of Lemon or other flavoring; whilst *Mistura* Potassæ Citratis indicates the old Neutral Mixture made by saturating lemon-juice with Bicarbonate of Potassa. It is quite desirable that prescriptions should clearly indicate which of these are intended, and it would be a great help if physicians would designate which of these they want by the affix "*Pharm.* 1860" after the name, until we all become familiar with the names.

American Pharmaceutical Association.—By a letter from Prof. Moore, of Baltimore, we are informed that arrangements have been made by the Maryland College of Pharmacy, to hold the sessions of the American Pharmaceutical Association in the Hall of the University of Maryland, in Lombard street, near Paca street. The meeting will convene at 3 o'clock, on the afternoon of September 8th. The Eutaw House is convenient to the University, and on a former occasion was the headquarters for the visiting members. It is much to be desired that the attendance should be full, and that members should report themselves early at the place of meeting. Information relative to the place of meeting may be obtained at the drug store, opposite the Eutaw House, of Prof. J. F. Moore, corner of Howard and Madison streets, and of Mr. A. P. Sharp, corner of Pratt and Howard streets.

New York Apothecaries.—We observe the following series of Resolutions published by authority in the American Medical Times for August 29th, 1863, viz:

"*Apothecaries and their Relations to the Medical Profession.*—At a meeting of the Kings Co. Medical Society, held July 14, 1863, the attention of the Society was called to the censurable course pursued by some of the druggists of the county. It was stated by several of the members that these gentlemen were in the habit of commenting upon prescriptions

to the disparagement of physicians, substituting other articles for those prescribed, and not unfrequently renewing the prescriptions without the knowledge or consent of the attending physician, and that they were in the habit of prescribing for patients. For these, among other reasons, a committee was appointed, who made the following report, which was adopted:—

Whereas, It is eminently desirable that the art of prescribing and dispensing medicines should conform, as far as possible, to scientific accuracy; therefore,

Resolved, That the Medical Society of the County of Kings recognizes the fact that physicians should be scrupulously careful in writing their prescriptions distinctly, and that they should use, as far as practicable, officinal names only.

Resolved, That it is the duty of dispensing apothecaries to put up prescriptions distinctly as directed, or to reject them, excepting, however, when there is cause to suspect a mistake; in which case, it is manifestly the duty of the apothecary to assure himself of the intention of the prescriber, before dispensing the prescription.

Resolved, That the practice which some apothecaries indulge in of treating cases of disease constitutes quackery in its worst form, because of the false confidence which their semi-professional character inspires in the minds of the people.

Resolved, That recommending nostrums, prescribing, criticizing prescriptions, or otherwise indulging in conversation tending to impair confidence in the author of a prescription, substituting other articles than those directed by physicians, keeping incompetent clerks, dispensing medicines of bad quality, repeating prescriptions against the expressed wish of the prescriber, and habitual carelessness, are all disreputable practices; and it shall be the duty of the members of this Society, who may hereafter become cognisant of such conduct, to report the same to the Society for the benefit of his Fellows.

Resolved, That these resolutions and preamble be approved by the President and Secretary in behalf of the Society, and published; and that a copy of the same be presented to every apothecary in the county, if practicable.

DEWITT C. ENOS, *Prest. Kings Co. Med. Soc.*
JOHN T. YOUNG, M. D., *Sec. Kings Co. Med. Soc.*"

We have no desire to approve of any form of pharmaceutical malpractice—here or elsewhere. We agree entirely in letter and spirit with the preamble and two first resolutions. We reprobate the custom of apothecaries prescribing in the strict sense of the term; but so long as *physicians* will keep apothecary shops and prescribe at their counters—and buying pills and other medicines wholesale, will retail them to their patients, who are within reach of reliable apothecaries, they excite a spirit of competition which results in counter-prescribing. The fourth resolution is very comprehensive in its charges—and covers nearly the whole ground of pharmaceutical iniquity, and where they do occur they should surely be visited by the reprobation of every high-minded apothecary, especially such as relate to causing injury to the reputation of the physician or tampering with prescriptions. No apothecary can be justified in this, designedly; and yet so absurdly are some prescriptions put to-

gether, and so carelessly are so many written, that with an earnest desire to screen the prescriber it is sometimes difficult to do it with certain persons. If the gentlemen of Kings County Medical Society, who issue these resolutions, feel themselves clear of practices which directly tend to demoralize apothecaries, and lead them to collateral and less reputable ways of gaining a livelihood, they are justified in issuing their manifesto, but unless they are, it will fall as a dead letter, or recoil on themselves.

The Physician's Visiting List, Diary, and Book of Engagements for 1864. Philadelphia, Lindsay & Blakiston.

The Publishers have already prepared their "Visiting List" for 1864, in two sizes—for 25 and for 50 patients. The prices of the former, are according to quality, 63 cents to $1·00, whilst the latter can be had for 75 cents and $1.25, the more expensive copies being bound in pocket-book style.

The Forty-fifth Annual Report of the Trustees of the New York State Library, transmitted to the Legislature April 7th, 1863, Albany, 1863. pp. 129, octavo, has been received.

Braithwaite's Retrospect of Practical Medicine and Surgery, parts 46*th and* 47*th, American Edition*, New York, W. A. Townsend, 1863.

From the publisher. These numbers are enriched with much matter calculated to interest the physician and merit his attention.

OBITUARY.—DR. WILLIAM DARLINGTON.—We have received a memorial of Dr. Darlington, and intended to have made use of it for this notice, but, having mislaid it, we avail ourselves of Dr. Gray's notice in "Silliman's Journal:"

"The Nestor of American Botanists died, at his residence in West Chester, Penn., on the 23d of April last, having nearly completed the 81st year of his age. The death of this most charming and unaffectedly good man, although occurring in the fulness of time, and following close (as was meet) upon the bodily infirmities which at length arrested the serene activity of the octogenarian,—waiting, but laboring still as strength and occasion served,—is sensibly felt, not only in the town and country where he has long been honored and venerated, but also by a wide circle of friends and correspondents throughout the country and in other lands. If not a very profound, he was a most accurate and faithful botanist, one who appreciated and largely imbibed the spirit of all the great advances in botanical philosophy, and especially in morphology, which have been made in his day. His *forte* was in the clear and accurate description of plants; his desire, to make perfectly known the plants of his native county; his modest estimate of his own labors in his favorite pursuit was expressed in the motto of his *Florula Cestrica*, in 1826, and repeated in his classical *Flora Cestrica* (one of the very best local floras ever written) in 1837 and 1853: '*Ore trahit quodcunque potest, atque*

addit acervo:' his love for the familiar objects which had attracted his life-long interest was characteristically shown in the inscription which he wrote for the stone that now covers his mortal remains: '*Plantæ Cestrienses quas dilexit atque illustravit super tumulum ejus semper floreant;*' while higher feelings and sacred hopes were fittingly expressed when on receiving the first warning, of which he knew well the significance, he said to those around him, 'My work is done; and I think I can say, with Simeon of old, 'Lord, now lettest thou thy servant depart in peace.'

But, much as he cultivated Botany, this was only the side-issue, the recreation of his life, which was actively devoted to professional and various civic occupations, and to the discharge of many honorable trusts."

Dr. Darlington was born in the village of Dilworth, now called Dilworthstown, in Birmingham township, Chester County, Pennsylvania, April 28th, 1782. He was the eldest child of Edward and Hannah Darlington, and descended from ancestors, each branch of which, as far as can be traced, was an unmixed race of plain English Quakers. His early life was agricultural, but becoming disgusted with the drudgery of farm labor, as then effected, he sought a better education, and in 1800 entered the office of Dr. Vaughan, of Wilmington, Delaware. It was while pursuing his medical studies that Dr. Darlington acquired a taste for the study of languages and mastered the French tongue, and in after years the Latin, Spanish and German languages were added. It was also when attending lectures at the University of Pennsylvania that, under the teaching of Dr. Benjamin Smith Barton, he began his acquaintance with his favorite science of Botany. He graduated in 1804, and commenced the practice of medicine in his native county. We have not space to follow the events of Dr. Darlington's life, but will hurriedly state that in 1808 he married the daughter of Gen. Lacy, of New Jersey; that in 1814 he volunteered in the service of the State during the English invasion; that he was elected successively a member of the 16th and 17th Congress, and to other offices, until in 1830 he was elected to the Presidency of the Bank of Chester County, a position he retained until his death. His "Florula Cestrica" was published in 1826. In 1837 his "Flora Cestrica," or description of the flowering plants of Chester County, appeared as a new edition of the former work. These and his other works, biographical and botanical, were all written during the intervals of his professional duties, and exhibit not only his eminent love of botany, but his disinterested labors in bringing to light the worthy cultivators of that science in his neighborhood. Temperate in his habits, moral and religious in his character, his mental faculties unimpaired to the last, he lived to a good old age, with the consciousness of a life well spent.